JANUARY, 1952

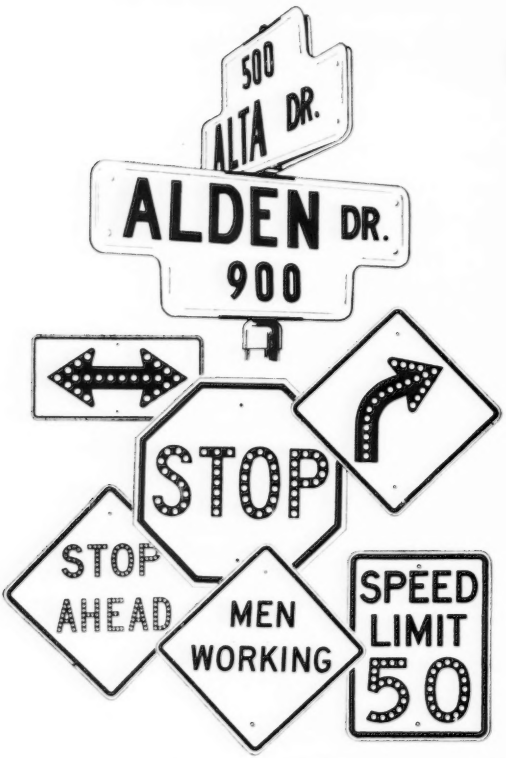
Traffic Engineering

Proposed Expressway Loop in Detroit

- Putting Traffic Engineering to Work in Detroit
- Recent Developments in Postcard O & D Surveys
- Ascending Lanes for Slow Moving Traffic
- Effect of Grade on Starting Headway Time
- Parking Facilities at General Electric's Schenectady Works

Official Publication of the Institute of Traffic Engineers

TO EFFECTIVE TRAFFIC CONTROL.....



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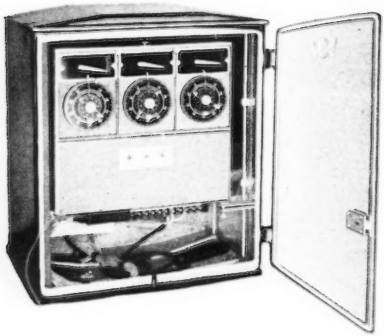

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Traffic Engineering

OFFICIAL PUBLICATION OF THE INSTITUTE OF TRAFFIC ENGINEERS

VOLUME XXII | JANUARY, 1952 | NUMBER 4

COVER: The proposed expressway loop around the central Business District of Detroit. In addition five radial routes and five cross-town routes of expressway design are planned—See article by A. F. Malo.

Traffic Engineering is that phase of engineering which deals with the planning and geometric design of streets, highways, and abutting lands, and with traffic operation thereon, as their use is related to the safe, convenient, and economic transportation of persons and goods.

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Frankly Speaking

THE completion of another Inventory of the City Traffic Engineering programs in over one-half of our United States cities with populations of more than 10,000 has brought out an interesting trend. Certain improvements or regulations for reducing congestion and accidents on city streets were given a more or less high priority in 1950. They are:

1. The adoption or expansion of the one-way street principle.
2. The prohibition of parking along certain streets at all times or during rush hours only on one or both sides.
3. The prohibition of certain turning movements at high volume intersections at all times or during rush hours only.
4. The establishment of special routes for commercial vehicles.
5. Modernization of existing traffic signal equipment for greater flexibility in timing.

We can plainly see from the above that more regulations are being continuously placed on vehicular traffic in order to increase street capacity. The intermittent type of regulation is now an accepted device in the traffic field. The need for greater use of existing streets for moving traffic is definitely recognized and has become almost equally important to the expressway or highway program.

However, we find that the problem of handling traffic in our smaller communities still needs a great deal of attention. More of these cities should place traffic engineering responsibility in the city engineer's office and more cities should consider the intermittent type of traffic regulations and control. A few of these cities have employed consultants and perhaps others should too, for such arrangement has worked out very effectively.

The *Institute*'s responsibility, through its Sections, should be to encourage city engineers to become affiliate Section members and by all means subscribe to "Traffic Engineering" and have in their possession a "Traffic Engineering Handbook." We can also urge attendance at State Traffic Engineering Conferences.

Yes, traffic is "complex and dynamic" and a changing problem. A great deal has been accomplished but by no means is the job complete.

Harry Porter Jr.

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Putting Traffic Engineering to Work in Detroit

By A. F. Malo (Mem., ITE)
City Traffic Engineer, Traffic Engineering Bureau, Detroit, Michigan

This is the eighth in a series of articles to be published in "Traffic Engineering" magazine, and written by traffic engineers of cities of various sizes in several parts of the country.

To fairly evaluate the contributions of traffic engineering in Detroit, the reader should be aware of some of the characteristics of the city and its two million inhabitants as they pertain to traffic.

The city is located on the north bank of the Detroit River on relatively level terrain. Standing as a citadel with its back to the river, the Central Business District looks out over a vast expanse of commercial, industrial, and residential areas to the west, north, and east. To the south, across the river, lies Canada. A conventional grid pattern of streets prevails throughout the city except for six wide radials which converge on the Central Business District from the outlying sections.

Detroit, the world center of automobile production, is primarily an industrial city. Because of the absence of a rapid transit system, it is almost entirely dependent upon privately-owned cars for its transportation system. One out of every three persons owns an automobile and must use it regularly.

History of Traffic Engineering Bureau

During the 20's and early 30's, the responsibility for traffic improvements rested on the shoulders of several departments in the city government with the result that traffic engineering was sadly neglected. Although many studies were conducted, little effort was made to use the information to bring about engineering improvements. This kind of traffic administration was prevalent until the inception of the present Traffic Engineering Bureau.

The story of organized traffic engineering in Detroit goes back to the years 1936-37 when the Michigan State Highway Department, in conjunction with the Works Progress Administration, conducted an extensive study of traffic conditions and the means of improving them. Their report, of course, recommended the establishment of a traffic engineering organization. In 1938, when the smoke finally had cleared from the scene, the city fathers had passed an ordinance establishing the Traffic Engineering Bureau as a separate department in the city government with the Traffic Engineer reporting directly to the Mayor and Council. The same ordinance established a Traffic Committee, composed of the heads of interested city departments, to advise with the Traffic Engineering Bureau and other departments on traffic matters. The ordinance also established the functions of the Traffic Engineering Bureau to include complete responsibility for the design and installation of all traffic control devices and for all engineering investigations of traffic conditions.

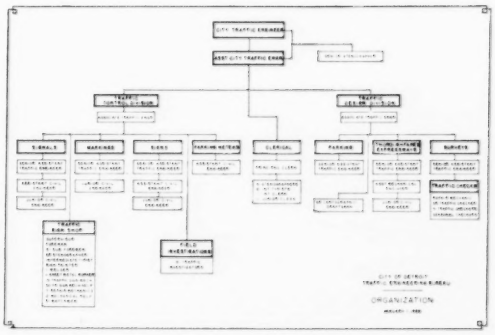


Fig. 1

The Bureau started off in a small way. The staff, at first, was limited to the City Traffic Engineer and a few assistants. Because they worked diligently, the citizens of Detroit were favorably impressed with the contributions of traffic engineering and were convinced of its immeasurable value. As a result the Traffic Engineering Bureau was able to expand its activities through the years to a degree somewhat commensurate with the general increase in traffic problems.

During the war years, the Bureau was able to continue its activities and also assume many responsibilities related to defense transportation, then, similar to many traffic engineering organizations in this great country, its greatest expansion was achieved during the years immediately following the end of the war.

In the general election last November, the citizens of Detroit approved a charter amendment which replaces the present Traffic Engineering Bureau with a Department of Streets and Traffic. The new department, to be activated about the time this issue of "Traffic Engineering" magazine goes to press, was created . . . "to centralize complete responsibility for the safe and expeditious handling of traffic" . . . and will have . . . "paramount interest in all traffic problems."

The charter amendment culminates the activities of a Mayor's Special Committee organized in 1950 to conduct a study of street and traffic administration problems with technical assistance provided by the Automotive Safety Foundation. At the time of this writing, it is believed that, in general, the internal structure of the Bureau will remain intact under the new organization, therefore, this paper is written on the basis of the present organization. The present organizational structure is illustrated in Figure 1. An associate traffic engineer is in direct charge of each of the Bureau's two divisions. The Traffic *Control* Division is responsible for all signs, signals and street markings while

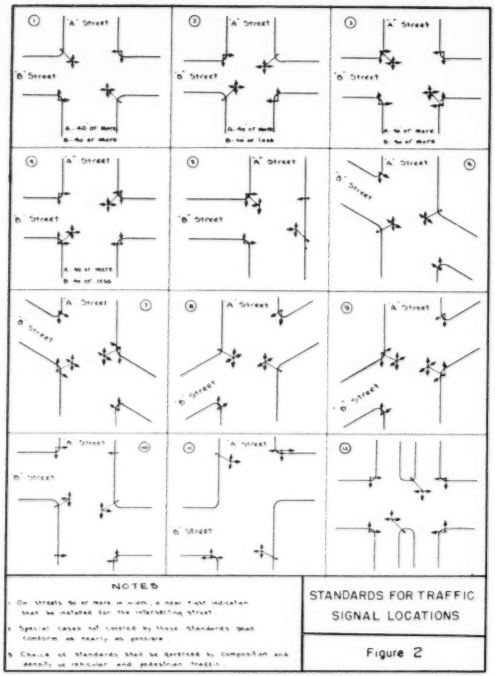


Figure 2

the Traffic *Design* Division handles all matters pertaining to parking, thoroughfare design, and surveys. The activities of these two divisions, the work they have done and their methods of operation will be the subject of later paragraphs.

It has often been said that the quality of personnel in an organization is even more important than the organizational structure. The Bureau is fortunate to have on its staff men who are well-trained in the application of traffic engineering techniques. Of the one hundred twenty-four persons in the organization, there are twenty-four qualified engineers, thirty-eight trained technicians, fifty-one laborers, and eleven clerical workers. This year's operating budget is well over $1.4 million.

The Traffic Control Division

The Traffic Control Division of the Bureau is charged with the responsibility of all matters pertaining to the actual operation of both vehicular and pedestrian traffic on the streets of Detroit. A traffic engineer has general supervision over each of the major phases of this work, namely, signs, signals, and street markings.

Many investigations relative to the need for various types of traffic control are required daily. In order to facilitate these investigations, the city is divided into five areas composed of three police precincts each, and a traffic investigator is assigned to each area. These men spend their entire time investigating traffic control problems in their respective districts. They collect the necessary factual information, write work orders for required sign installations and prepare the necessary correspondence and reports on the project. All problems requiring the installation of signals or street markings are referred to the engineer in charge of that phase of the work for proper action.

Traffic Control by Signs

All traffic signs used in the city are completely fabricated, erected, and maintained by the Traffic Sign Shop. Sign designs recommended in the Manual on Uniform Traffic Devices are used exclusively. Last year, about 25,000 traffic signs were manufactured and installed in the City of Detroit. A large proportion of them (68%) were sign replacements. Signs fabricated by our sign shop have an expected life of approximately four years, therefore, a routine replacement schedule is carried out on this basis.

In 1948, the Bureau assumed responsibility for maintaining all street name signs in the City of Detroit. In carrying out this activity, the Sign Shop manufactures and installs approximately 30,000 street name signs each year. This amounts to about one-fourth of all the street name signs in the city so that each sign is replaced once every four years. The new signs are made of steel and are reflectorized.

Traffic Control by Street Markings

In many instances, the use of street markings provides the best means of obtaining the required control of traffic. For a given problem at a given location, careful study is made to determine exactly what type of markings are needed and whether they should be reflectorized. When the determination is complete, a detailed drawing of the location is made by the engineer in charge of marking showing exactly where the markings should be applied. From this drawing, a crew from the Sign Shop can accurately apply the markings to the pavement.

Plastic button markers are used in many cases to delineate crosswalk, lane, and center lines so that adequate visibility can be maintained during the winter months when snow and ice render conventional paint lines ineffective. Some 50,000 buttons were installed during the past year.

Traffic Control by Signals

The Traffic Control Division conducts the required studies to determine where traffic signals should be placed and how they should be timed and operated. The general layout plan is prepared together with work requisitions covering the method of operation and timing which are forwarded to the Public Lighting Commission for execution. By virtue of existing budget arrangements, all installations and maintenance are performed by that agency. The Bureau originates all materials requisitions and, in cooperation with the Public Lighting Commission, prepares specifications for such materials.

We have found that a definite pattern must be followed when making signal installations, i.e., signals should be located similarly at all intersections along a thoroughfare. Formerly, no organized pattern was followed and confusion resulted as to where drivers and pedestrians were to look for the signals. In order to overcome this weakness of poor visibility in our signal system, new installation standards were devised wherein two signal faces of either the mast-arm or span wire type, are provided over the driving lanes in each direction. The use of curb mounted signals has been retained in order to provide adequate signal indications for pedestrians. The signal installation standards now used in Detroit are shown in Figure 2.

Under certain conditions where heavy pedestrian travel exists, and at most signalized school crossings, the special "Walk—Don't Walk" signals are used. Their operation is of the type which tells the pedestrian when to cross and also indicates whether there is enough time left to make a normal crossing. As an example, the pedestrian may arrive

at the intersection during the "Don't Walk" phase. When the indication changes to "Walk" he knows he has ample time to make the crossing. However, when the remaining time is not sufficient for crossing at a normal pace, the "Don't Walk" indication begins flashing off and on. If a pedestrian faces this indication he knows that he either must hurry to cross the street or wait for the "Walk" phase of the next cycle.

A before and after study of 40 locations treated to improve signal visibility for both pedestrians and drivers showed a reduction of 40 per cent in right-angle accidents and 37 per cent in pedestrian accidents. This was during a period when city-wide accidents increased 18 per cent. A four-year program is being started to modernize, in this manner, all traffic signals on Detroit's major streets. The total cost of this program will be about $1,300,000.

At the present time, almost 85 per cent of all traffic signals in Detroit are progressively timed. Eventually, signals on through streets will be operated with three dial controllers to permit flexibility in handling rush hour traffic. Such systems are now in operation on two major streets and one congested area.

Street Lighting

Street lighting has been used extensively in Detroit to reduce night-time accidents. Our function is to recommend specific locations where additional street lighting should be installed. This is determined, of course, on the basis of an analysis of accidents at the location and is usually done in conjunction with other engineering improvements in the area. The technical planning and installation of all street lighting is carried out by the Public Lighting Commission.

School Crossing Program

Detroit has developed a unique method of handling the school crossing problem. Although the school safety patrol does an excellent job of controlling the vast majority of Detroit's 5,000 school crossings, officials are continually bombarded with requests for traffic signals and adult supervision at school crossings. Since 1944, the Traffic Engineering Bureau has cooperated with the Board of Education and the Police Department in a program of rating all school crossings according to potential hazards. The principle factors used in determining hazard ratings are traffic volume and speed, roadway width, and number of children. A numerical weight is assigned to each factor, the total of which for a given crosswalk equals its hazard rating. Using this procedure, it is possible to list all crosswalks in the city according to their relative hazard. This forms a kind of "priority list" for administering the crosswalk improvement program and also becomes a very useful tool in dealing with requests for unwarranted protection at crosswalks.

Before—Traffic Hampered by Street Obstruction.

After—Improved Street Handles 5,000 Vehicles Per Day.
Fig. 3

Railroad Grade Crossing Program

A similar technique was used to establish a railroad grade crossing program. In 1943, a comprehensive study of the city's 268 railroad grade crossings was made wherein each crossing was rated on the basis of traffic volume, accident experience, visibility, road surface, number of tracks, and number of trains per day. This permitted an evaluation of the accident hazard at each grade crossing in terms comparable to the hazard at other crossings and provided a sound basis for determining the relative need for the different types of accident prevention equipment at each crossing. Similarly, the congestion potential at each crossing was rated to determine the relative need for grade separations. As a result of this program, improvements have been completed at 196 crossings.

Traffic Design Division

So far only what is being done in Detroit to adjust the movements of traffic to the physical limitations of our present street plan has been discussed. Another extremely important phase of the work—that of adjusting the present street pattern to meet the ever-changing needs of traffic—is carried out by the Traffic Design Division. The function of this unit is to determine the need for improvements in the street plan and to design those improvements on the basis of traffic facts. Our traffic design engineers are concerned mainly with the planning of thoroughfares and expressways, and with changes in the geometric design of existing streets. Major improvements in parking regulation and design are also the responsibility of this division.

Thoroughfares

Despite the relatively well-designed street pattern, Detroit's major thoroughfares do not have the capacity to take care of today's record-breaking volumes. To improve the situation, attention was turned to the six radials in an effort to increase their capacity. Since the war, modern signal controllers have been installed to provide progressive flow at all times on two of the radials and plans have been completed to provide similar improvements on the others. Parking restrictions during peak hours and the prohibition of left turns has resulted in further increases in capacity, but the radials are still overloaded.

One-Way Streets

The predominance of the grid system has permitted creation of new thoroughfare capacity by establishing a pattern of one-way streets. Detroit's first pair of one-way streets was established late in 1939 to relieve the heavy north-south traffic on Woodward Avenue. Their immediate success led to the establishment of another pair of one-way streets less than a month afterwards. Traffic volumes on the one-way streets were found to increase 32 per cent on the average with a considerable decrease in driving time. Armed with the beneficial results from these one-way streets, the Bureau was able to establish other one-way restrictions with relatively minor objections. Today, there are, in Detroit,

60.9 miles of streets restricted to one-way travel.

An example of how new thoroughfares have been developed is illustrated in the before-after pictures in Figure 3. During investigations to find methods of relief from congestion on a nearby major thoroughfare, the Traffic Engineering Bureau found that this street was ideally located for use, along with a parallel street, as part of a one-way system. Previously, through-traffic had been discouraged by the existence of a large park area which blocked the street and effectively divided it into two segments as shown in the "before" picture. Traffic desiring to travel the full length of the street had to resort to the side streets in order to circumvent the park area. Continuation of the pavement through the park was completed in 1949 and today carries eight thousand cars per day.

Expressways

The construction of Detroit's expressway system is just getting into second gear. The original plan was to build the system on a pay-as-you-go basis, but the immediate need for relief from surface street congestion has resulted in the approval of a bond issue plan.

Approximately 3 miles of expressway have been completed. Under construction at present are the Edsel Ford Expressway, which is a continuation of the Detroit Industrial Expressway and runs 13.8 miles crosstown to the easterly city limits, and the John C. Lodge Expressway, running 5.7 miles northwest from the Central Business District to the northerly city limits. The design of the intersection of these two expressways is a traffic engineer's dream. A total of 12 bridges are being constructed to provide direct turn ramps for all movements from the four approaches. The 14-foot median strip on both expressways has been widened to 124 feet to provide room for the direct turn ramps without requiring 3 level structures. Although steel shortages threaten construction plans, there is still hope that these two badly needed expressways will be completed within 4 years. Eventually, the expressway plans call for five radial routes from the Central Business District, 5 cross-town routes, a distributor loop around the Central Business District (see front cover), and two outer circumferentials.

Channelization

Channelization has been used extensively in Detroit to reduce traffic congestion and accidents. An example of extensive channelization is illustrated in Figure 4. Formerly the 6-way intersection was wide open allowing traffic to find its own way through the maze. Traffic operations were further complicated by the presence of a trolley line which crossed the intersection diagonally, traveling some 200 feet on the "wrong" side of the street. The "after" drawing shows how the intersection was channelized to provide effective control of each traffic movement. Further improvements in signalization have resulted in a safe and efficient intersection.

Channelization does not have to be complicated in order to be effective. Many "hot" traffic problems can be eliminated by very simple channelization. As an example, at one Detroit intersection, traffic was sometimes "backed up" for as much as a half-mile on one approach. Investigation showed that a heavy right turn movement was causing the trouble. Construction of an additional lane for the right turns completely eliminated the bottleneck so that traffic very seldom backs up more than 200 feet.

Pedestrian Islands

An increase in pedestrian accidents, resulting from a

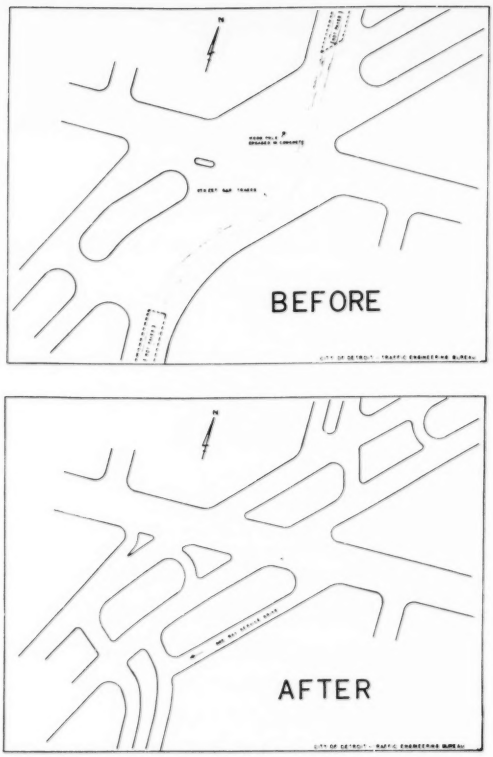


Fig. 4

combination of heavy vehicular and pedestrian traffic on wide thoroughfares, was the motivation for an extensive study in 1948 to determine the best design for pedestrian safety islands. One design consists of a pedestrian platform and handrail protected from vehicular encroachment by a sloping concrete abutment designed to deflect vehicles with minimum damage. The islands were installed at major intersections along a section of heavily traveled thoroughfare and a 60 per cent reduction of pedestrian accidents was revealed by the one-year before and after study. The islands also functioned to channelize vehicular traffic, resulting in a 67 per cent reduction in head-on collisions and a reduction of 36 per cent in the number of left turn accidents.

Parking

Until a State Enabling Act was amended in 1947, the City of Detroit was seriously hampered in its attempt to solve the parking problem. The revised law legalized the use of parking meters and provided that the city could pledge meter revenues for the acquisition of off-street parking facilities. Immediately thereafter, the Traffic Engineering Bureau was given the responsibility of administering a Parking Meter Program and a Municipal Parking Authority was created to handle all off-street parking improvements.

In order to determine where parking meter control would prove beneficial, parking surveys were conducted to

(Continued on page 145)

Recent Developments in Post Card Origin and Destination Surveys

By Robert E. Barkley (Jun. Mem., ITE)
Traffic Engineer, Smith, Dibble and Company
Traffic and Planning Consultants, Columbia, South Carolina

EDITOR'S NOTE—*This article describes two Origin and Destination Surveys made by the controlled post card method. Mr. Barkley was the Director of both of these surveys.*

TRAFFIC engineers charged with the responsibility of locating and designing major highway facilities in urban areas are placing ever increasing value upon origin-destination data. Wider application of such studies has resulted in considerable refinement of survey techniques, particularly during the past ten years.

Origin and Destination Surveys in Indiana

Typical of the experience of many organizations is that of the State Highway Commission of Indiana. Studies conducted prior to World War II were of a very limited nature and were made primarily to determine the justification for by-passes. Travel patterns were obtained by roadside interviews or by recording license plate numbers at a cordon of stations. A novel means of recording vehicle registrations by use of dictaphones was described in the August, 1942, issue of "Traffic Engineering."

Using the dwelling unit as the basis for sampling, comprehensive origin-destination surveys were made in Fort Wayne, South Bend, and Indianapolis during 1944-1945. These three surveys closely followed the techniques developed by the Bureau of Public Roads. A modification of the home interview method, in which the sample was selected from the vehicle registration lists, was used in Elkhart in 1948.

During the summer of 1949, the travel patterns of the Calumet area were obtained from roadside interviews at a network of internal and external cordon stations. This method, which has not been extensively used, was particularly adapted to the Calumet region because of its heterogeneous nature.

The success of the *controlled post card type of survey* in several other states led Indiana to experiment with this method in the 1950 Evansville traffic survey. This study was carried out in two phases. Roadside interviews of drivers crossing the cordon revealed the travel patterns of external trips entering the survey area; and post card questionnaires mailed to vehicle owners within the cordon gave the distribution of internal trips.

External Roadside Interviews

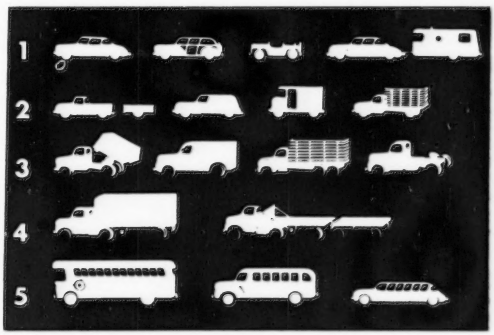
The cordon was selected so as to encompass all of the incorporated area of Evansville and, in addition, the heavily populated adjacent suburban developments. Extensive use was made of natural barriers in establishing the limits of the survey area in order to reduce the number of potential roadside interview station locations. All roads crossing this cordon were considered to be possible locations for stations; those with a 24-hour traffic count of over 500 vehicles were actually operated. On this basis, 24 of the 27 crossings of the cordon were selected as operating stations; these intercepted 99.2 per cent of the traffic entering the survey area. Those roads carrying more than 500 vehicles between 10:00 P.M. and 6:00 A.M. were operated for twenty-four hours; the remainder were operated from 6:00 A.M. to 10:00 P.M.

On all prior surveys vehicles had been classified into types according to their gross weight, i.e., Type 1—passenger cars, Type 2—1½-ton trucks, etc. Considerable difficulty was experienced with this classification because the weight estimates were subject to a large degree of variation between the different personnel making the counts. In order to avoid discrepancies, a new vehicle classification scheme based upon wheel and axle arrangement was devised for the Evansville study. Each manual counter and interviewer was given a sketch showing the types of vehicles falling into each classification. This scheme resulted in far greater uniformity of classification than had heretofore existed. Later in the survey a correlation was established between the wheel and axle arrangements and the gross weight.

A total of 68,260 drivers were interviewed at the external stations; representing 83 per cent of the total vehicles passing through the interview stations during their hours of operation.

Post Card Survey

Post card questionnaires were mailed to every passenger car owner living within the cordon area. Addresses were obtained from the vehicle registration lists. However, since Indiana registers vehicles only by counties, and since many addresses on the registration lists were given as rural route numbers, some difficulty was encountered in determining which vehicle owners giving rural route addresses lived within the survey area. It became necessary to check post office department records in order to pinpoint the locations



Vehicle Classification Scheme Used for Evansville Study.

of certain vehicle owners. This was a relatively minor job, requiring only a few days' time by several persons.

In addition to passenger car owners, all owners of only one or two trucks were mailed cards. Taxi and fleet operated truck trip data were obtained by personal interview. Passenger car owners were given a green card and truck owners received a yellow card.

The post card was carefully designed with the following principles in mind:

1. The card was kept as brief and as simple as possible. By making the destination of one trip automatically the origin of the next, the confusion of the terms "origin and destination" was not introduced into the form.
2. The card was kept anonymous by having the address portion removable. This was done in the hope of encouraging more complete returns.
3. Space was left on the cards for coding. However, coding blocks were left out so as to avoid confusing the vehicle owner.

Publicity for Survey

Early in the planning stages of the survey it was recognized that the success of the internal phase would depend upon a high degree of public cooperation. The survey received excellent coverage by both the press and radio. The week before the 32,750 cards were mailed out, a feature article appeared in the Sunday paper that described in some detail the objectives of the survey. On the following Sunday, another news story was carried on the front page and, in addition, a cartoon and a sample of a filled-out card were included. Sunday was chosen for the release of these articles inasmuch as the paper had a wider circulation on that day than any other.

Approximately one-fifth of the cards in each tract were mailed out each day so that the total mail delivered would be made on each of the five week days. This was done in order to obtain a distribution of the trip reports from Monday through Friday. During the week that the cards were being delivered, the need for filling out and returning them was constantly impressed upon the local citizenry through all available publicity media. Front page cartoons appearing in the local paper did much to promote local interest. However, the returns were disappointingly low—only 13 per cent of the cards had been returned by the end of the first week. Those that had been sent in were filled out in reasonably good form, indicating that the citizenry had understood the instructions.

During the second and third weeks following the mailing of the cards, efforts at obtaining returns were directed along the following lines:

1. Continuation of news releases to the press—a letter from the mayor urging citizen cooperation appeared; statistics giving the percentage of returns from different sections of the city were published daily with the hope of stirring up sectional competition; and several feature stories were printed.
2. Extensive use of radio facilities—over 100 spot announcements and news releases were broadcast from the three local stations. For several days members of the survey staff were assigned to each of the stations to receive trip reports by phone from those who had discarded their cards.
3. Phone calls to zones with exceptionally low returns—these calls resulted in a large number of the cards being returned, and a number of trip reports were obtained by phone interviews.
4. Personal interviews in those zones with few phones—these interviews revealed that the poor returns were due to illiteracy on the part of those residing there, or their migrant status.

YOU'RE THE DOCTOR!

NO STAMP NEEDED JUST DROP IN A MAIL BOX
TRAFFIC CONDITIONS
YOU AND 35,999 OTHER AUTO OWNERS
THE BY-MAIL SURVEY ONE DAY "TRIP REPORT" CITY-STATE-FEDERAL AUSPICES FOR A STUDY TO PROVIDE PROPER ROUTING-NEW STREETS-RELOCATE HIGHWAYS BRIDGES ETC IN EVANSVILLE AND COUNTY.

While the final returns were not as impressive percentage wise as those obtained in similar surveys in other states, the concerted publicity efforts did have a very marked effect in boosting the final returns to 10,807, or 33.0 per cent of those mailed out. In addition, it was quite encouraging to note the completeness with which a day's travel was reported, resulting in an average of 4.5 coded internal passenger car trips per card. The similar ratio for trucks was 4.8.

Accuracy of Data

Analyses of the data have shown that the screen line accuracy for passenger cars was 96.51 per cent and for trucks 92.5 per cent. These results were considerably above the most optimistic estimates of the survey staff, based upon the accuracy obtained in previous surveys. In time, cost, and reliability, the post card method is now considered superior to the home interview method (where mass transit need not be considered), at least in the opinion of Indiana.

A large industrial plant several miles outside the external cordon line was used as a second check on the accuracy of the survey. Internal-external trips to this plant were reported both on the post cards and from interviews at an external station. Zoning and coding were so set up that a comparison of these two sources of trip information could be made. This special check showed that 4,864 passenger car trips were reported by external interviews, as contrasted with 4,849 passenger car trips reported on the post cards.

While the post card returns were not as large as expected, the survey could be considered a success. The experiment in Evansville with the controlled post card substantiated the favorable experiences of other states, notably Ohio.

Winston-Salem O. & D. Survey

The story of the controlled post card survey would not be complete without mentioning another type that has been used extensively, particularly in determining external traffic

patterns. The survey procedure is best illustrated by an example, this time taken from a recent study in Winston-Salem, North Carolina. As a part of the planning for an interstate highway connection through that city, card distribution stations were established on each of the twelve principal highways entering the metropolitan area. The average 24-hour traffic volumes passing through these stations ranged up to 10,000 vehicles. Each station was operated from 6:30 A.M. to 6:30 P.M.—these hours covering both the morning and evening peaks. The survey was scheduled so as to occur during the peak of the tobacco market season, which extends over several months.

The return postal cards were designed to be twice the size of the standard penny post card. One-half of the card contained an example and a brief description of the survey; the other half (the mail-back portion) contained space for the trip information. Drivers were asked to give the origin, destination, and purpose of the trip they were making when they received a card.

Three different groups of cards were printed, each with distinctive color and a five digit serial number. White cards were given to passenger cars, pink cards to single-unit trucks, and yellow cards to tractor-trailer units. Odd-numbered cards were given to outbound traffic; even-numbered cards to inbound vehicles.

The cards were distributed by uniformed police officers working on their off days; these men proved to be exceptionally courteous and commanded a great deal of driver respect. Two officers were assigned to each station and provided their own relief. A card was given to each motorist as he passed through the station. At the end of each hour, a record was made of the serial numbers of the cards distributed during that hour, thus providing an hourly classified count. In addition, an automatic counter at each station provided a check on the hourly records and a 24-hour traffic volume.

As the cards were returned to be coded, it was a simple matter to break them down into type of vehicle by color, and into station number, direction, and hour by serial number.

Some 33,780 cards were distributed at the twelve stations. Of these, 14,220, or 43.3 per cent, were returned in a codable condition. This high rate of return can be attributed to several factors:

1. The police officers were well trained in the art of public relations, and encouraged voluntary public cooperation.
2. The highway study has been a subject of considerable local interest, and has received considerable publicity through the press and radio.
3. The card was kept as simple as possible, in order to encourage motorists to read all of it. Where traffic volumes were light enough to permit it, the cards were explained in detail to motorists, and in some cases filled out at the station. This, incidentally, helped the stability of the sample on the lower traffic volume stations.
4. The cards were distributed with a minimum amount of delay to the motorist. In very few instances did a line longer than five cars form, and these were soon cleared up.

In future surveys of this type, it would be well to warn the motorist in advance that he will get a card for each trip he makes through the station on the day of operation. Some confusion existed on this point which was cleared up by verbal instructions; sufficient publicity would have eliminated the need for the latter.

This survey method proved to be a very satisfactory way of determining the external traffic patterns, and in this particular case was believed to be superior to roadside interviewing.

Conclusions

It would seem that the development of origin-destination survey techniques has reached a point at which accurate and fairly inexpensive methods are now available. New procedures will be developed, but more attention might now be given to the analysis of the data. The current study of the Highway Research Board on traffic diversion is a much needed answer to part of the problem; questions remain concerning the generating potential of various land uses, seasonal and yearly changes in traffic distribution characteristics, and the stability of various sampling methods.

Officers distributing return post cards—Winston-Salem survey.

HOW ...to forget about
TRAFFIC LANES for
the next 4 to 6 years....
DUR-O-LINE LANE MARKERS
Some sales territories open... write for information.
will provide bright, clear traffic lanes without any further attention... no costly repainting! DUR-O-LINE Markers are plastic discs that can easily be put down on concrete, asphalt or wood. Color (either yellow or white) will not fade or dull. Breakage is rare. DUR-O-LINE Markers offer tremendous savings over cost of painted lines. Investigate today!
WRITE Dept. T for information about sample DUR-O-LINE Lane Markers
TRAFFIC SAFETY SUPPLY CO.
N. E. SANDY BLVD. AT 27TH, PORTLAND 12, ORE.

Ascending Lanes for Slow-Moving Traffic on Long Inclines

By Allan R. Pepper (Mem., ITE)*
Traffic Engineer, Colorado State Highway Department

THE effect of trucks and other slow-moving vehicles upon practical highway capacity is an important consideration in the planning, geometric design, and adaptation of traffic ways to serve existing needs. In mountainous or hilly terrain, especially where two-lane facilities predominate and where road alignment and profile combine to influence sight distance, the plodding movement of heavily loaded commercial vehicles on upgrades interrupt traffic flow, provoke hazardous passing maneuvers, and contribute to peak period congestion.

The Rational and Empirical Approach

One of the most reputable reference works available to highway and traffic engineers in the study of the ability of roadways to accommodate traffic is the "Highway Capacity Manual" prepared by the Committee on Highway Capacity of the Highway Research Board. One of the declared objectives of the publication is to offer "scientific means of rationalizing the extent to which the driver of a vehicle is deprived of his freedom to maneuver at various traffic volumes by considering the amount his speed and other factors are restricted by other vehicles on the highway." By assigning numerical values based upon observed densities and controlled conditions, the Capacity Manual supplies a series of multiplying factors by which the practical or working capacity of a given roadway may be computed under specified conditions. Acceptance of basic values are subject to deduction or adjustment for all known variables such as lane width, grade, alignment, sight distance, shoulder treatment, traffic composition, and operating speed. Moreover, it is recognized that there is an intermediate range between practical and possible capacities within which highway officials must exercise their own sound judgment in deciding upon a satisfactory or tolerable capacity as dictated by local conditions.

In actual traffic engineering practice, determination of desirable capacity is predicated more upon what speed and what degree of congestion can be tolerated rather than simply upon the factor of roadway capacity. Consequently, in developing design criteria and specifications for improved highway facilities the rational or theoretical approach must be tempered with the empirical approach to assure acceptable operating conditions. The successful application and adaptation of well-founded principles and warrants to meet traffic conditions and reduce accident experience is one of the greatest challenges to professional traffic engineering.

TABLE I
APPROXIMATE EFFECT OF COMMERCIAL VEHICLES ON PRACTICAL HIGHWAY CAPACITIES EXPRESSED AS NUMERICAL EQUIVALENT OF PASSENGER CARS (P.C.)

		Terrain		
		Level	Rolling	Mountainous
One Commercial Vehicle on Multilane Highway	=	2 P.C.	4 P.C.	8 P.C.
One Commercial Vehicle on Two-Lane Highway	=	2.5 P.C.	5 P.C.	10 P.C.

Effect of Commercial Vehicles on Practical Highway Capacities

Significant to a study of truck lane practice are the data compiled by the Highway Research Board to describe the effect of commercial vehicles on highway capacities. Interpreted in tabular form in Table I are pertinent comparisons drawn from research findings expressing the effect of trucks as the numerical equivalent of passenger cars operating upon level, rolling, and mountainous terrain.

Commercial vehicles reduce the capacity of a highway in terms of vehicles per hour because they occupy greater road space and influence traffic over a larger area than do passenger cars. It will be noted from Table I that the effect on rolling terrain is 100% greater than that produced on level terrain. Likewise, the effect of trucks in mountainous terrain is 100% greater than on rolling terrain. In mountainous areas one commercial vehicle has approximately the same effect as eight passenger cars.

Approximately the same operating conditions will prevail on a two-lane highway through mountainous terrain when there are 900 passenger cars per hour as when there are 9 trucks and 810 passenger cars per hour or a total of 819 vehicles. It may also be observed from Table I that the effect of commercial vehicles is about twenty-five per cent greater on two-lane highways than on multilane roads.

Capacity Determinations Compensating for Effect of Commercial Vehicles

The intricacies of capacity determinations requiring computation of cumulative effect from a series of applicable multipliers influenced the Traffic Engineers Advisory Committee of the Ohio Highway Study Committee to develop in 1949 a table of final capacity values suitable for ready reference by engineers when making their

*This is a preliminary subcommittee report of ITE Technical Committee No. 5, *Planning and Geometric Design of Traffic and Pedestrian Ways.*

respective appraisals.

Shown in Table II is one of Ohio's comprehensive tabulations assigning capacity values to two-lane rural highways for both directions of flow during peak periods. Variable quantities are provided according to considerations of percentage of commercial vehicles, lane width, type of terrain, sight distance, and operating speed. The values indicated are those that can be expected to prevail where drivers seek freedom of choice of speeds within the range of 45 to 50 miles per hour and represent those capacities beyond which varying degrees of congestion or delay will be evident. As in Table I, "commercial" vehicles are considered to be those equipped with dual tires. Light delivery trucks, panel trucks, etc. are not included in the category.

Operational Characteristics on Grades

The effect of trucks on capacity is greatest where alignment is poor and grades are long and steep. Narrow or improperly maintained shoulders further reduce operational efficiency. Most of all, restrictive sight distances which usually accompany steep grades impair traffic flow and create congestion at low volumes. The Committee on Highway Capacity of the Highway Research Board observes that the greatest need on rural two-lane highways is for sight distances that will permit vehicles traveling under 50 miles per hour to be passed safely. Passing sight distances within the range of 1,500 to 2,000 feet are recommended as most widely needed.

To minimize the effect of trucks on highway capacity and efficiency, the Highway Research Board recommends the construction of added lanes on upgrades especially in mountainous terrain. In all probability, this recommendation developed from the traditional courtesy observed by truck drivers in pulling over to the shoulder of the road to allow passenger cars and faster moving vehicles to pass. Provision of an uphill or ascending lane on a two-lane highway does not create a three-lane road in the usual sense of the term for the middle lane of a three-lane highway is understood to offer traffic in either direction an equal right in overtaking or passing.

Warrants for Uphill or Ascending Lanes

Establishment of acceptable "Warrants for the Addition of Climbing Lanes on Hills for Slow-Moving Traffic" has been selected by the Committee on Geometric Highway Design of the Highway Research Board as one of twenty-six subjects of greatest importance in the field of highway engineering design. According to the Board, this problem is under consideration for current emphasis, and research promotion is well along.

Preliminary investigations indicate that uphill lanes are needed to provide satisfactory operating conditions on two-lane highways when traffic includes at least ten per cent commercial vehicles and grade characteristics and hourly traffic volume fall within categories outlined in Table III. This table, prepared by the Highway Research Board, is based on the assumption that a three-lane highway on which traffic in both directions has an equal right in the center lane has no place in modern highway design. Also, when the hourly traffic volume used for design purposes (30th highest hourly volume in the year) exceeds 800 vehicles, a four-lane divided highway is recommended for any condition of gradient or alignment. If the sight distance is restricted to less than 1500 feet on portions of the highway other than the grade under consideration, an added truck lane or a four-lane highway is considered necessary for traffic volumes lower than those shown in the table. Frequency of accident experience should become a necessary corollary in the application

TABLE II

PRACTICAL TRAFFIC CAPACITIES FOR TWO-LANE RURAL ROADS FOR SPEED FROM 45 TO 50 M.P.H.
(In Terms of Total Vehicles Per Hour*)

LANE WIDTHS	TERRAIN	COMMERCIAL VEHICLES											
		0 TO 10%			10 TO 15%			15 TO 20%			OVER 20%		
		A	B	C	A	B	C	A	B	C	A	B	C
12'	Level	870	800	730	820	750	680	780	720	650	750	690	630
	Rolling	860	790	720	690	640	580	630	580	530	570	520	480
11'	Level	750	690	630	700	650	590	670	620	560	640	590	540
	Rolling	730	670	610	590	540	500	540	490	450	490	450	420
10'	Level	670	620	560	630	580	530	600	550	500	580	530	490
	Rolling	660	610	550	530	490	450	480	440	400	440	400	370
9'	Level	610	560	510	570	520	480	550	500	460	520	480	440
	Rolling	600	550	500	480	440	400	440	400	370	400	370	330
8'	Level	560	520	440	520	480	440	500	460	420	480	440	400
	Rolling	550	510	430	440	400	370	400	370	330	360	330	300

*Values Given Above Are Totals - 2/3 in One Direction 1/3 in the Other

A = No sight distance restriction.
B = Sight distance restricted 25% of distance.
C = Sight distance restricted 50% of distance.

TABLE III

EFFECT OF GRADES ON TYPE OF HIGHWAY FACILITY REQUIRED WHEN THE TRAFFIC INCLUDES 10 PERCENT COMMERCIAL VEHICLES WITH DUAL REAR TIRES.

Gradient (Percent)	Traffic Volume (Vehicles per hour)	Length of Grade	Type of facility required to provide satisfactory operating conditions for passenger cars: Two-lane highway	Two lane highway with truck lane on uphill side	Four-lane highway
0	800 or less	Any length	x	-	-
	Over 800	Any length	-	-	x
3	550 or less	Any length	x	-	-
	551 to 800	1100 feet or less	x	-	-
		Over 1100 feet	-	x	-
	Over 800	Any length	-	-	x
4	500 or less	Any length	x	-	-
	501 to 800	800 feet or less	x	-	-
		Over 800 feet	-	x	-
	Over 800	Any length	-	-	x
5	400 or less	Any length	x	-	-
	401 to 800	600 feet or less	x	-	-
		Over 600 feet	-	x	-
	Over 800	Any length	-	-	x
6	350 or less	Any length	x	-	-
	351 to 400	4000 feet or less	x	-	-
		Over 4000 feet	-	x	-
	401 to 800	Under 500 feet	x	-	-
		500 to 4000 feet	-	x	-
		Over 4000 feet	-	-	x
	Over 800	Any length	-	-	x
7	300 or less	Any length	x	-	-
	301 to 350	4000 feet or less	x	-	-
		Over 4000 feet	-	x	-
	351 to 800	Under 500 feet	x	-	-
		500 to 4000 feet	-	x	-
		Over 4000 feet	-	-	x
	Over 800	Any length	-	-	x

of all basic requirements.

Truck Lane Practice in Colorado

In 1948 the Colorado State Highway Department completed a highway construction project under Federal Aid participation calling for an additional twelve foot width on the ascending side of an upgrade south of Denver on U. S. 85-87, known as Blakeland Hill. This special design feature constituted the first provision made for an extra uphill lane on the traditional two-lane highways of the state.

Public enthusiasm for the innovation induced the Department to utilize maintenance forces in making similar improvements on long inclines of existing roadways where restricted sight distance and a high percentage of truck traffic contributed to peak hour congestion. Work on these so-called "Maintenance Projects" consisted simply of cutting away the bank and broadening the shoulder to extend the pavement to the desired width. (See Fig. 1).

Subsequently, the practice of providing these uphill lanes for slow-moving traffic gained added impetus and has now become an established policy of the Department. In fact, a resolution to continue and extend the program of providing an extra lane for slow-moving vehicles on ascending grades as rapidly as funds become available was endorsed by the Engineering Division of the state-wide Highway Safety Conference called by the Governor of Colorado on June 29 and 30, 1951.

Signing and Marking

Appropriate signing and marking must, of course, be instituted to give significance to the extended sections of pavement and delineate the movements of traffic. Signing and marking specifications developed for truck lanes by the Traffic Operations Section of the Colorado State Highway Department are described in Figure 2.

Fig. 1
Typical truck lane facility on long incline at approach to Colorado mountain pass.

It will be noted that the marking system and color scheme conform to the national uniform pattern for both center line and no-passing barrier stripes. Painted crosshatching is utilized to define the restricted area serving as a transition to and from the standard two-lane road width. Because of some variation in the widths of oil mats on different highways, particularly in mountainous areas, it was found necessary to stipulate suitable widths for ascending and passing lanes commensurate with existing physical conditions. Recommendations for these dimensions are summarized in the notes appearing on the signing and marking diagram.

Signs used to supplement pavement markings and control parking are represented in the lower part of the signing and marking diagram. Each of the signs employed in conjunction with truck lane installations is a counterpart of a basic standard appearing in the national "Manual on Uniform Traffic Control Devices." Slight adaptations have been made in the sign legends to fit existing conditions. Signs instructing slow-moving traffic to keep to the outside lane and those admonishing passing vehicles not to cross the yellow lines are posted for uphill traffic at the entrance to a truck lane and are repeated at major junctions. Signs forbidding motorists to pass when the yellow line is in their lane are erected for downhill traffic at the exit from the truck lane and are repeated at each major junction point. Parking is prohibited at all times on the highway.

Public Reaction

The public has taken the truck lane projects to heart with much the same elation as a baseball fan feels for a home run swatter. Compliments have poured into the Colorado State Highway Department from every direction, and suggestions have been made that similar improvements be installed on all Colorado's mountain highways which carry a heavy burden of traffic.

The Colorado State Patrol reports that the double-laning of one section of the highway (the ascending or uphill side) has been particularly effective in handling throngs of tourists and visitors in the summertime.

Representative of public reaction is a recent letter from a Colorado motorist who writes as follows:

"One of the finest innovations in the control of traffic on the mountain highways, in recent years, is the decision of the traffic agency to create a double lane for uphill motor-

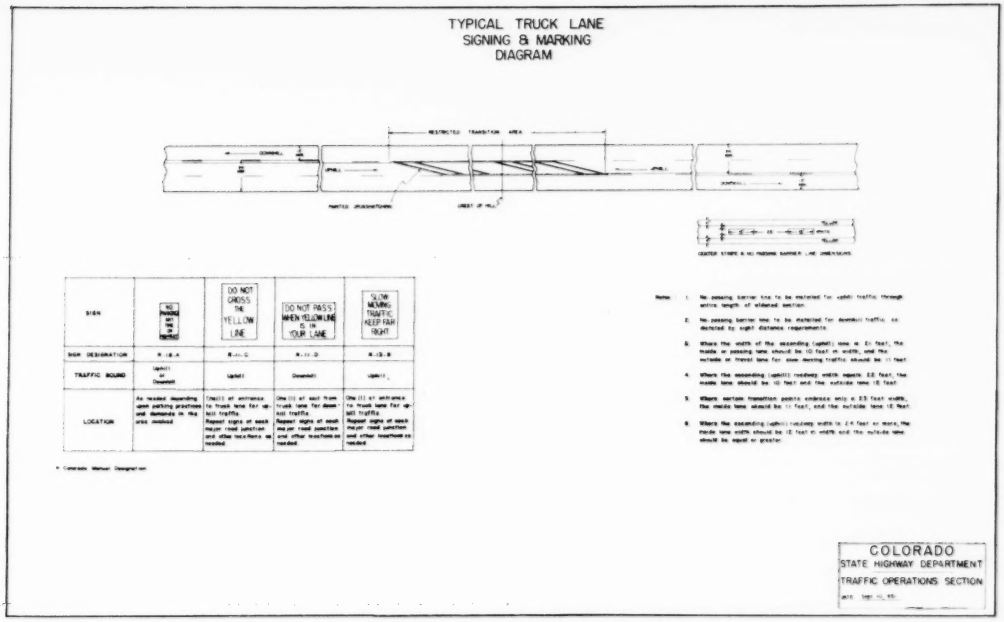


Fig. 2

ists. This has removed the long queues of cars struggling to pass the slow truck which because of the many and dangerous curves made it well-nigh impossible to pass safely for long distances. The confinement of downhill traffic to one lane certainly does not work a hardship on the motorist. Experience shows that it is much safer to go uphill at forty miles an hour than it is to descend at thirty. As a citizen of the state I want to express my deep appreciation to the Department for its efforts to lessen the hazards on our highways and increase the safety factor for those who use them."

Recommendations for Continuation of Truck Lane Study

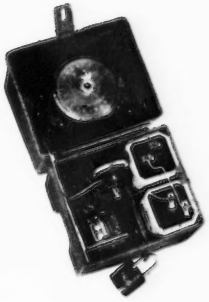
A survey of truck lane warrants and applications in other states is now needed to expand upon this preliminary report and direct the findings toward a national policy guide or determination. The high interest in this subject was apparent at the American Association of State Highway Officials' annual meeting in October when a joint session of the Committee on Traffic and the Committee on Design was held to discuss the warrants, design and operating experiences of truck lanes. Additional investigation is to be undertaken as a project of the ITE Technical Committee on Geometric Design of Traffic and Pedestrian Ways and the data accumulated will be used to develop a comprehensive report.

Railroads Use Them

About 25,000 trucks and buses are directly owned by the nation's railroad systems, in many cases hauling passengers, mail, and goods that railroads could not otherwise handle at a profit. The Railway Express Agency, which is wholly owned by the railroads, operates 15,000 trucks, 1,400 trailers and semitrailers and 500 cars.

PERIOD COUNTER

The Period Control Traficounter (model PC) is a portable, automatic counter designed for use with a pneumatic type road tube. The special feature of this model is its ability to receive counts during any portion or period of the day.



It may be turned on and off automatically at predetermined intervals. Thus a set of *Period Control Traficounters* may be correlated by a single operator and readings taken at any convenient time.

The Period Counter is made to give only one count for every two vehicle axles to pass over the road tube.

STREETER-AMET COMPANY
1726 Belle Plaine Avenue • Chicago, Illinois

Effect of Grade on Starting Headway Time

By Richard A. Conley (Jun. Mem., ITE)
Engineer of Surveys and Plans, Department of Traffic and Transportation, City of Houston, Texas

DUE to existing topography, there are many locations where signalized intersections have approaches that are on positive or negative grades. Previous studies on intersection operation[1] and intersection capacity[2] make no mention of what possible effect grade might have. Many characteristics of intersections as they are related to traffic flow were studied but there has not yet been an opportunity to consider grade.

Since negative grades tend to aid the accelerating ability of vehicles and positive grades detract from it, the headway times should increase as the negative grade decreases and continue to increase as the positive grade increases. In fact, on the steeper positive grades it would be expected that accelerating ability would be drastically affected and a point would be reached where starting headway times would begin increasing more and more rapidly. This point might very well serve to determine a grade beyond which signalization would be impractical or as a determinant of the need for a grade reduction project.

This expected effect should be considered as a factor in determining intersection capacity. The timing of the traffic signal would be directly affected, depending on the grade of the approaches to the intersection. Thus it is felt necessary to determine the magnitude of this effect so that it may be considered in the search for ways to improve the efficiency of operation of intersections.

Definitions

The following terms are defined as they are related to the problem being studied:

Starting headway time—the time space between two successive vehicles observed at the point of entrance of the vehicles into the intersection. The vehicles observed are only those that were stopped before entering the intersection because of the signal. The point of entrance into the intersection is taken as the near curb line.

Approach grade—the grade of the street or roadway on which the vehicles observed were stopped. It is readily recognized that most intersections with approaches on a grade are more or less level in themselves and the approaches blend into the intersections gradually. However, at all the locations studied this blending did not detract from the effect of the grade on the vehicles as they started.

Vehicle position—the location of a vehicle in a line of stopped vehicles with respect to the intersection. The closest vehicle to the intersection is the first, the following one is the second, etc.

[1] B. D. Greenshields, et al, *Traffic Performance at Urban Street Intersections*, Technical Report No. 1, Bureau of Highway Traffic, Yale University, 1947.

[2] Highway Capacity Manual, Bureau of Public Roads, U. S. Department of Commerce, Washington, D. C., 1950.

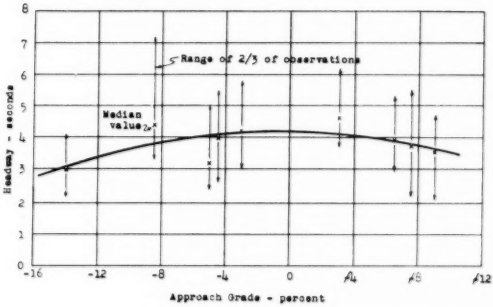


Fig. 1
Starting Headway Time of First-In-Line Vehicle.

Field Method

The equipment used in making observations of starting headway times was an Esterline-Angus 20 Pen Recorder, an instrument for changing electrical impulses into visible indications in ink on a moving tape of paper. The electrical impulses were made by closing a telegraph key operated by the observer. An appropriate coding system was used to identify the beginning of the green interval and to distinguish between passenger vehicles, medium trucks and heavy trucks.

Turning movements were not classified in this study nor were causes of delays noted in any way, since it was only desired to obtain the actual headway times of all vehicles. Only the first eight vehicles were observed during each interval since insufficient observations were obtained for positions beyond the eighth.

In selecting locations to serve as a source of data for this study, the following conditions had to be met:

1. Intersection should be signalized with modern type fixed time control equipment.
2. The several intersections should have approximately the same physical features.
3. The traffic flow should be fairly heavy so as to afford ample opportunity for taking data.
4. The approach grades at the several intersections should cover as wide a range as possible.

The locations finally selected are considered to meet these conditions reasonably well. Nine different approach grades were studied ranging from −14 to +9%. They were located in New Haven, Connecticut, and surrounding smaller towns. In order to take advantage of the heaviest flows, observations were made during the evening peak hours from 3:30 to 6:00. All the data were gathered during the first half

Mr. Conley was a student at the Yale Bureau of Highway Traffic during the academic year 1950-'51, and this article is based on his student thesis research.

of March 1951. Weather conditions were cloudy and cool and the pavement was dry in all cases.

Analysis of Data

A preliminary inspection of the data showed that there was insufficient data regarding trucks to make any sort of analysis so these were discarded and only passenger cars not influenced by trucks are considered. A total of 2,323 observations remained upon which to base this analysis.

A frequency distribution of headway times for each vehicle position at each study location discloses a definite skewness with the majority of values in the lower part of the range. This is to be expected since there is a limit to the shortness of time between vehicles following each other past a given point.

This median value was used as the most representative value of each distribution. There seemed to be a central tendency indicated in most of the distributions and the median value is considered more typical of a series than the mean because it is not affected by extreme values.

The median value of starting headway times for each position at each location is as shown in Table I. It will be noted that at each location the headway times between successive vehicles decreases at a lessening rate, meaning that as speeds increase, the time spacing btween vehicles decreases.

TABLE I

Starting Headway Times of Passenger Vehicles on Grades

Approach Grade	Median Headways—Seconds							
%	1	2	3	4	5	6	7	8
−14	3.0	2.8	2.4	2.6	2.5	2.6	2.3	2.6
− 8.5	4.4	2.4	2.3	2.0	2.1	1.7	1.8	2.1
− 5	3.2	3.3	3.1	2.8	2.7	2.6	3.2	2.7
− 4.5	4.0	2.8	3.0	2.7	2.3	2.3	2.0	2.6
− 3	4.2	2.9	2.8	2.5	2.5	2.3	2.3	2.4
+ 3	4.6	3.0	2.9	2.6	2.6	2.6	2.8	2.3
+ 6.5	3.9	3.0	3.0	2.7	2.3	2.1	2.4	1.9
+ 7.5	3.7	3.2	2.8	2.8	2.5	2.5	3.4	2.1
+ 9	3.5	3.3	2.5	2.7	2.4	2.4	2.2	1.7

Previous studies have borne out this same relationship. Of course, some variation from this true effect must be recognized, particularly in the higher numbered vehicle positions. This is due to the lack of enough observations to determine a very significant central tendency. In some cases there were less than ten observations to determine the median value shown.

It will be noted that for all vehicle positions except the first there is practically no variation in starting headway time for the range of grades studied. However, in the first vehicle position there is a decided variation. The curvilinear relationship is shown in Figure 1 with the range of two-thirds of the observations superimposed at each grade studied. It is seen that the headway time increases as the negative grade decreases, reaching a maximum of about 4.2 seconds at zero per cent grade and then decreases as positive grade increases.

Interpretation of Results

This effect in the first vehicle position is certainly not what was to be expected. The only way that the effect of headway time decreasing as positive grade increases can be rationalized is to consider the characteristics and habits of the driver. A vehicle stopped on a positive grade waiting to move forward is being acted upon by a force tending to make it roll backwards. The driver is aware of this force and consciously or subconsciously tries to overcome it. Some drivers use their emergency brakes, some their footbrakes,

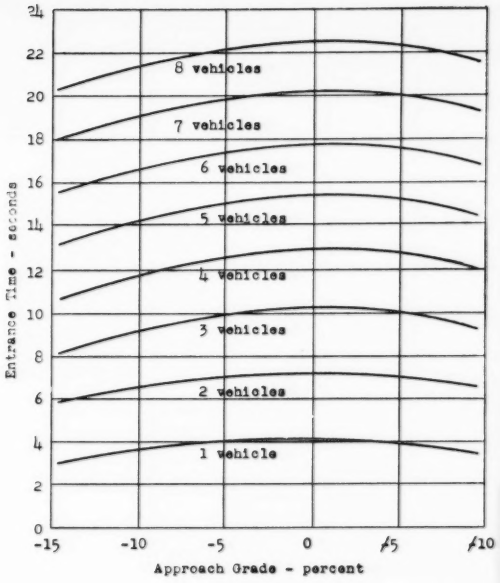


Fig. 2

Time for Given Number of Vehicles to Enter Intersection.

and some even race their motors and slip their clutches slightly to keep from rolling back. But whatever method is used, it is evident that drivers on positive grades are more alert to the change of the signal to green. This would naturally reduce reaction time and help the driver make a quicker "getaway" when he starts. Having to wait on a signal while sitting on a positive grade is irritating to a driver and he is anxious to remove himself from such a condition.

It should be remembered that Table I and Figure 1 do not reflect the effect of trucks. Entirely different relationships would probably exist if enough data were available to consider trucks only or varying percentages of trucks and passenger cars.

Effect of Results

The effect of grade on starting headway time does not appear to be serious. The first-in-line vehicle is actually the only one affected to any great extent from the standpoint of individual headway time. However, the time it takes any vehicle to enter the intersection from a stopped position depends upon the starting headway time of each and every vehicle preceding it. The effect on the first vehicle is then carried back through the entire line of vehicles. This immediately raises the questions of how the intersection's ability to handle traffic will be affected and what effect it will have on the timing of the signal.

The values of entrance time in Figure 2 are obtained by adding the starting headway time of a given vehicle in Table I to the starting headway times of all vehicles preceding it. From these curves the effect of grade on the first vehicle can be clearly seen to be reflected back through the entire line of succeeding vehicles.

(Continued on page 146)

The Parking Facilities at General Electric's Schenectady Works

By R. K. Hickey
Plant Protection and Security

PROVIDING adequate parking area has always been more or less of a problem at General Electric's Schenectady Works. In any plant of our size it would be. But, it wasn't until the late 30's when our employment figures began to rise in earnest, that the problem reached the proportions that it has today.

During the peak-employment war years, when more than 43,000 persons worked at the plant, it reached an alarming stature. Despite car pools, gas rationing, and curtailment of automobile production, the number of cars using company lots reached more than 5,000. It was at that time that the company began to thoroughly systematize its parking plans.

Today, as employment figures are again creeping upwards, . . . now approximately 38,000 . . . the problem is more serious than before. With some 5,000 less people than during the war, the parking lots are, nonetheless, called upon to accommodate 3,000 more cars. Each day, more than 8,000 vehicles of all kinds and description pull into company parking lots. As one employee put it, "Every day is like Sunday at the State Fair!"

But, fortunately, the plans formulated almost ten years ago are beginning to bear fruit. Despite the enormity of our problem . . . or perhaps because of it . . . we think we have developed one of the finest industrial parking systems in the country. We make no claims to originality of course. Ours is probably a composite of many systems. The main distinguishing feature of it is perhaps the unusual number of vehicles we've had to deal with.

Perhaps the best way to explain the system thoroughly would be to take an imaginary new employee . . . we'll call him Sam . . . and go with him step by step through the process by which he becomes a regular parker in good standing in our Schenectady Works parking lots.

First of all, a day or two after being hired, Sam, if he owns a car and whether or not he intends to drive to and from work, will receive an application for a parking permit. The permit will be his authorization to park on company parking lots and will be in the form of a windshield sticker. The application and the permit are attached and are part of an I.B.M. set up. Later on should we ever have any need for any of the information Sam will put on the application, the system will enable us to sort through the cards at a rate of 650 a minute. At present, we have more than 25,000 cards on file. Many of our employees, though they own cars, almost never drive to work. Others join car pools and drive every other day or once a week.

On the application, Sam will fill in his name and address, the make and license number of his car, and the building in which he'll be working. Depending on which building he'll be in . . . there are some 240 in the Works . . . he'll be assigned to one particular parking area and given the identifying sticker for his windshield.

Probably the biggest problem we have in assigning Sam a place to park is the fact that, due to our particular location, all of our parking areas are located on the same side of the plant. This means that many people might have to walk across the length of the parking lots and then completely through the plant before getting to their place of work. We try to avoid this by assigning people working on the far side of the plant to the parking areas closest to it. Those who work closer to the parking lots are put in areas farther out.

So, even though Sam may still have a bit of a walk getting to work, it's probably a lot less than it would be were he left to park anywhere at will. The gummed sticker he'll put on his windshield will be either lettered or numbered and will indicate the zone in which he has permission to park. It will also act as his pass into the plant grounds every morning for cars without such a sticker are stopped by the plant guards. In addition to his zone number or letter, the sticker will also have a parking permit number on it. This will be filed in the Plant Patrol Headquarters.

In setting up the zones, we have tried to go pretty much according to buildings. People in the same building will almost always park in the same zone. At present, we are experimenting with "herringbone" and other types of parking but still have the majority of our zones arranged for straight-in parking. What Sam may never realize is that the parking zones are in an almost continual state of change. The only indication he might have of it would be if he were to notice that the signs marking off his particular zone were occasionally moved a few feet in one direction or another. The reason for the changes is due to the fact that the population of the various buildings is constantly changing for one reason or another. A close check is kept and when the percentage of employees in any one building drops or increases, the parking area for that building is changed accordingly. The number of cars assigned to any one area is not determined by actual count, but by estimated averages. With 38,000 people, the cost of an actual count . . . in both time and money . . . would be prohibitive.

At the end of each year, Sam's parking permit will be cancelled and a new one issued. This is to allow for the shifted population of the buildings and to take care of any employee who may have been transferred and neglected to have his permit changed. Our chief aim though is to try to be completely fair to everyone and Sam is no exception.

In the meantime, Sam's application has been thoroughly processed and cross-filed according to his permit number and the license number of his car. The reason for this is so that the guards who make an almost constant patrol of the parking areas, can quickly locate Sam should he go off and leave his car with the lights on or the motor running . . . yes, even that's happened . . . or should they notice he has a flat tire. A secondary use to which the cross-file is put is to

View of Main Parking Area at General Electric's Schenectady Works.

check the traffic routes by which the drivers travel to and from work and thus give us a good picture of the flow of traffic in the plant area. But, traffic, of course is a problem by itself.

In addition to being on the look-out for car trouble of any kind, the plant guards also keep a check to see that no one is parked in a zone other than the one to which he has been assigned. When such a case is discovered, the car is immediately towed away by one of our tow trucks and placed in the "car pound" at the furthermost end of the plant. The owner is then notified that his car has been moved and a record kept of that fact. The towing system is the successor to a red ticket system which we found was being pretty much ignored by the violators. We felt the only way to make the thing work and be fair to everyone was to put some teeth in it. The towing system has thus far worked out very well.

The main use to which we put the tow trucks however, is as an employee service. Should an employee have a low battery or motor trouble of any kind, the tow trucks are at his disposal. On cold winter afternoons, they are constantly on hand as the different shifts come out to offer assistance in case of trouble.

If our friend Sam had been a handicapped person, he would have been issued a special sticker for a parking area as close to his place of work as possible. People who have recently returned to work from an illness are also given special parking areas if they request it. Should someone have a special reason for getting away from work early one day, he could be issued a temporary sticker for a nearer area for as short a time as a half day. Special parking facilities have also been set aside for visitors as well.

In the winter time, before Sam comes to work, giant bulldozers will clear away the snow from the lots and, should it snow during the day, they do the same.

Although more than one-fifth of the total plant area has been set aside and developed for parking facilities. The lots are mainly gravel filled, cinder topped and are periodically rolled and oiled. The cost of upkeep for the parking areas is estimated at around $60,000 a year.

As with all carefully worked out systems, we ran into a few little problems. One of the most interesting of these . . . although more humorous than important . . . was an outgrowth of parking sticker "counterfeiters." Despite all we could do, many people after parking still had quite a walk to take before reaching their place of work. The overwhelming majority realized the problem we had to face and were more than willing to cooperate and accept the area to which they were assigned. But, as with everything, there were also a few who were not so willing. As a result, we discovered some very clever, . . . even ingenious, . . . people among our employees.

There was a draftsman in our Turbine Division who very carefully drew himself a windshield sticker for a parking area closer to where he worked than the one to which he had been assigned. The official sticker is white with a black letter or numeral on it. His was an almost perfect copy and he probably would still be parking where he felt he should except for one slip on his part. He had forgotten to erase his trace lines and a sharp-eyed guard spotted it.

Another fellow had taken the original sticker issued to him, pasted a plain white square over it and rigged up a cellophane back into which he could slide whatever letter or numbers he wished and thus, park anywhere he happened to feel like.

A few cases also cropped up where employees were exchanging stickers so they could park in an area more to their liking. This wasn't too difficult to handle since it was simply a matter of checking the permit number on the sticker with the permit number on file in our office.

But, these, as I said before, were isolated cases and were the rare exception rather than the rule.

In the ten years we have had the zone-sticker system in force, we've found it to be one that works to a high degree of efficiency on a problem of no little magnitude. We've found too that it has had a good effect upon our Employee Relations Program. Despite a few recalcitrants and minor griping, we've found that the same rules have applied to parking problems as applied to any other. Recognize your employees' problems and make an honest attempt to solve them; treat them equally and with respect. In return you will receive their gratitude and a high degree of cooperation. So far our system has worked out well, and most of the time we're pretty proud of the way its operating.

(Continued from page 134)

determine the turnover and degree of utilization of curb parking facilities. On the basis of these and other studies, 5,700 parking meters have been installed since 1948.

In cooperation with the Municipal Parking Authority, the Traffic Engineering Bureau has collected and analyzed parking data, prepared revenue estimates, and assisted in selecting sites for parking structures in the Central Business District.

Zoning for off-street parking has become a reality in Detroit. An ordinance passed in 1947 requires that off-street parking space be provided for the use of occupants, employees, and patrons of all buildings erected after the effective date of the ordinance. Detailed specifications are set up to establish the number of spaces required for each type of building use. For example, theaters must supply one space for every six seats under 1,000 and one space for every four seats over 1,000. Retail stores must provide one space for each 333 square feet of floor space and industrial buildings must have one off-street space for every five employees.

Other Activities

Civil Defense

The Traffic Engineering Bureau has assumed important Civil Defense responsibilities in Detroit. In the event of

an atomic holocaust, traffic planning will be the key to success of all post-bombing rescue activity. Accordingly, we have prepared sound plans for keeping traffic lanes open during the critical periods following an attack. Although we hope they will never be used, we are determined to be prepared—if and when a bombing does occur.

Public Relations

Traffic engineers, by this time, have come to realize that good public relations can mean the difference between success and failure of traffic engineering proposals in any city. In recognition of this fact, the Bureau is planning a program to acquaint the public with its activities through the medium of the press, radio, and television.

In general, we want the citizens of Detroit to know what we do and a little bit of how we do it. Any changes in traffic operations are given full description in the local newspapers before they go into effect so that drivers may understand the changes and be able to re-adjust their driving habits with a minimum of confusion and delay.

Summary

In an evaluation of our activities, we could probably say that the accomplishments of the Traffic Engineering Bureau during its thirteen years of existence have been many fold. Unfortunately, however, they are not enough to allow us to sit complacently in our chairs with a feeling of self-satisfaction. For despite all our efforts, we still have too much congestion and too many accidents!

(Continued from page 143)

In a given interval of time the more vehicles that can enter the intersection the higher that intersection's capacity. The implication of Figure 2 in this regard is that an approach on either a positive or negative grade enables the intersection to handle more traffic than a level approach. It is recognized that for only a few cars the influence is small if not negligible but for heavy traffic conditions it would at least be beneficial and not detract from the intersection's capacity.

It was expected that negative grades would shorten the entrance time of vehicles and positive grades would lengthen it. This would necessitate some adjustment in the timing of the signal to accommodate the necessary number of vehicles depending on the magnitude of the effect of the grade. The findings of this study show that for positive grades the original hypothesis is just reversed. It is clearly seen from Figure 2 that if a signal is timed assuming a level approach the waiting vehicles will be easily accommodated if the approach is on either a positive or negative grade.

Conclusions

On the basis of the data collected in this study and the foregoing analysis, the following conclusions are set forth:

1. The starting headway time of the first-in-line vehicle on a grade at an intersection increases as negative grade decreases and decreases as positive grade increases. This variation is slight and amounted to only 1.1 seconds for the range of grades studied.

2. All vehicles stopped on a grade at an intersection feel this effect when they start in terms of entrance time into the intersection.

3. A positive or negative grade approach to an intersection tends to slightly increase the capacity of the intersection.

4. In considering approach grades in signal timing it may be assumed that enough time is provided if the approaches are regarded as level.

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By V. T. Boughton
Associate Editor
Engineering News-Record

Median Width and Accidents on the Pennsylvania Turnpike*

SOME critics of the Pennsylvania Turnpike have blamed its accident record in part on its flat and narrow (10-ft.) median zone, and lack of any shoulder along the median zone. Cars out of control cross the zone, they state, and cars overtaking and passing a string of slower cars frequently are forced into the median zone by one of the cars in the string also starting a passing movement.

Gerard B. Gilbert, assistant to the chairman of the Turnpike Commission, states that its records do not support this criticism. And he points out that a driver who starts to pass a string of slower cars at such a high rate of speed that he cannot avoid being forced into the median by one of the slower cars starting a passing movement, is himself guilty of reckless driving. If an accident results, Mr. Gilbert says, the fault is the driver's, not the design of the turnpike.

The same applies to accidents resulting from U-turns. Making U-turns is forbidden on the turnpike except to the police, Mr. Gilbert says, and if a driver makes a U-turn instead of proceeding to the next interchange to turn back, he is the cause of any accident that may happen.

Painting a 4-in. wide white line, surfaced with reflective material, along the edge of the pavement next to the median zone was recommended by the Turnpike Safety Committee. The committee noted that many accidents occur while cars are passing, and said that this would be a guide to drivers while passing at high speed.

That recommendation has not yet been adopted by the commission, but on the newly opened section of the western extension of the turnpike the commission has painted the white center line 12 in. to the right of the center joint of the pavement. This has the effect of adding about 18 in. to the apparent width of the passing zone as the white line normally is painted to the left of the joint.

In this connection it is of interest to note that on the New York State Thruway the passing lane is made 13 ft. wide instead of 12, as on Pennsylvania Turnpike.

DEATHS IN TRAFFIC ACCIDENTS
(Number per 100-million vehicle-miles)

Year	Pennsylvania Turnpike	Rural Pennsylvania	Rural United States
1941	10.7	14.7	15.2
1942	10.9	13.7	12.9
1943	8.0	14.5	13.6
1944	14.5	14.1	13.5
1945	11.2	14.1	13.6
1946	9.8	13.5	12.3
1947	5.8	**	11.4
1948	7.3		10.9
1949	10.0		10.2
1950	12.4		10.5

**Figures for 1947-1950 not available

Both the New Jersey Turnpike and the Ohio Turnpike are to have shoulders along the edge of the passing lane where it adjoins the median zone as a protection for passing drivers who may be forced off the pavement due to the start of a passing movement by a vehicle in the line he is attempting to pass.

Because there have been head on collisions on the Pennsylvania Turnpike due to cars crossing the flat, 10-ft. wide median zone into opposing traffic lanes, most of the newer toll highways are being built with wider median zones. An exception is the northern end of the New Jersey Turnpike where it passes through the densely built up metropolitan district.

Because the medians on the Pennsylvania Turnpike are flat and narrow there have been several fatal accidents resulting from a driver stopping his car on the outer shoulder of the eastbound (or westbound) lanes and crossing all four lanes and the median on foot to reach a restaurant or service station on the outside of the opposing lanes.

TRAFFIC AND ANNUAL ACCIDENT FIGURES ON PENNSYLVANIA TURNPIKE

Oct. 1, 1940, to Dec. 31, 1950

Year	Number of Vehicles In Thousands			Vehicle Mileage In Millions			Vehicles Involved In Accidents			Total Accidents	Fatal Accidents	Fatalities
	P.C.	Comm.	Total	P.C.	Comm.	Total	P.C.	Comm.	Total			
1940	560	70	640	47	6	53	189	30	219	138	5	5
1941	2,280	330	2,630	208	33	242	579	188	775	529	20	26
1942	1,140	360	1,520	88	38	129	252	186	444	298	12	14
1943	640	350	1,000	49	38	87	136	155	252	212	7	7
1944	780	350	1,140	59	37	97	163	181	349	232	12	14
1945	1,210	370	1,600	103	38	143	225	169	395	238	12	16
1946	2,100	470	2,600	192	49	245	340	156	500	331	14	24
1947	2,494	575	3,100	224	65	292	397	232	634	399	13	17
1948	2,728	798	3,564	247	91	342	493	325	837	535	21	25
1949	3,084	928	4,051	271	116	391	590	378	976	609	28	39
1950	3,532	1,206	4,774	329	143	476	933	662	1,641	949	42	59
Totals	20,548	5,807	26,619	1,817	654	2,497	4,297	2,662	7,022	4,470	186	246

It was this type of accident that was put forward as one of the arguments in favor of reversing the position of the eastbound and westbound lanes of the proposed Ohio Turnpike, putting all service stations, restaurants and maintenance shops in a widened median zone. That proposal was turned down recently by the Ohio Turnpike Commission for various reasons.

That a wider median zone would stop this practice appears improbable, unless the median was densely planted or fenced. The Pennsylvania Commission is attempting to eliminate this source of accidents by erecting from 1,500 to 2,000 ft. of substantial fence in the center of the median at the service stations and restaurants. It already has put up signs on lanes opposite all stations telling how far it is to the next service point on that side.

*Reprint (in part) from *Engineering News Record*, October 18, 1951

Report on Resolution Concerning Steel Allocations

One of the six resolutions adopted at the Annual Meeting concerned the allocation of steel and other critical materials for highway purposes. This Resolution was worded as follows:

WHEREAS, it is obvious that limited access highways are a vital necessity to the Nation's metropolitan areas and would serve to minimize congestion in the event of an attack by enemy bombers, and

WHEREAS, construction of several such projects in various states for which rights of way have already been acquired and plans and specifications prepared, is now being retarded as a result of insufficient allocations of steel for highway purposes, therefore

BE IT RESOLVED, that the Institute of Traffic Engineers petition the appropriate officials of the U. S. Government to allocate sufficient steel and other critical materials for highway purposes, so that the construction of such vitally needed improvements can proceed on schedule.

Acting on the Resolution, President Nathan Cherniack addressed letters to Charles Sawyer, Secretary of Commerce, and Charles E. Wilson, Director, Office of Defense Mobilization, transmitting the Resolution and stating, in part:

"We are, of course, cognizant of the fact that during the National emergency we cannot expect to continue our economy on a 'business as usual' basis. Nevertheless, you must undoubtedly be aware, as we are, of the fact that in a number of major cities, the required expansion in the output of defense industries will be largely dependent on essential additions to highway transportation facilities that must serve adequately to transport personnel between home and plant, freight to and from plants, and in the event of an enemy air attack, prevent wholesale loss of life for lack of adequate highway facilities.

"We are, therefore, concerned over the fact that in these cities, limited access highways, bridges and tunnels for which plans and specifications have been prepared, real estate acquired and which are now under construction, have been subject to recurrent delays in progressing construction by reason of insufficient allocation of structural steel and other critical materials.

"In view of the widespread deterioration of the Nation's existing highway facilities that had taken place during World War II and the extraordinarily rapid post-war expansion of vehicular traffic in the post-war period, we believe, therefore, it is imperative that the construction of new highways, bridges and tunnels continue uninterruptedly during the current National emergency if our economy and our military establishments are to be served with the highway transportation they require to operate at maximum efficiency."

The following reply was received by President Cherniack from the Secretary of Commerce:

"This will acknowledge receipt of your letter of November 13, 1951, with a copy of Resolution No. 6, adopted by the Institute of Traffic Engineers, regarding allocations of steel and other critical materials for the highway program.

"Claimant agency functions for highway construction and maintenance operations have been delegated to the Bureau of Public Roads, a part of the Department of Commerce. The State Highway Departments had been asked to survey all essential highway needs for steel and other critical materials. The Bureau of Public Roads, after screening the requirements according to established criteria of essentiality, agreed with the results of the State Highway Departments' surveys and presented the estimates to the Requirements Committee of the Defense Production Administration.

"That committee, after reviewing the requirements of other segments of the Nation's economy and the requirements of defense agencies, has substantially cut the highway allocations.

"We assure you, however, that the Bureau of Public Roads will continue to present and interpret highway needs to the Requirements Committee of the Defense Production Administratioon in an effort to secure adequate allocations of critical materials in support of the highway program."

The letter addressed to Mr. Wilson was acknowledged. Mr. Thomas Burke, Director, Government and Public Service Division, Office of Civilian Requirements, replied as follows:

"Mr. Manly Fleischmann, Administrator, Defense Production Authority, has requested that I reply to the letter which you wrote to Mr. Charles E. Wilson on November 9, 1951. I have given careful consideration to the Resolution No. 6 by the Institute of Traffic Engineers concerning the necessity for an increase in the allocation of steel and other critical materials for highway purposes.

"I am pleased to be able to report that since the date of your letter the Defense Production Administration has reviewed the request of the Bureau of Public Roads for a supplemental allotment of critical materials and has granted an additional 10,000 tons of carbon steel, including 2,500 tons of structural steel. While the amounts of controlled materials allotted to the Bureau of Public Roads to support the first quarter 1952 road-building program are still considerably below the requirements of the Agency, nevertheless, the supplemental allocation is intended to provide steel for numerous small projects which otherwise might not be completed during this period.

"In allotting steel for first quarter 1952 construction programs, the Defense Production Administration has determined not to make the World War II mistake of post-

poning the entire highway construction program during an emergency. While the first quarter 1952 allocation will result in a cut-back from the 1950 and 1951 rate of construction, it is hoped that it will provide for normal maintenance and for the most urgently-needed new highway construction projects, including access roads in defense areas.

"After allocating critical materials for the military, the Atomic Energy Commission, and the expansion of defense industries, the amount required by all other claimants was considerably above the available supply. For example, the total requirements for structural steel in the first quarter 1952 are 205 per cent of current production. The principal reasons for this crucial shortage of steel are the sharp rise in military requirements and the decision to divert more structural steel to the expansion of the steel and aluminum industries, so that more raw materials will be produced for future needs of the armed forces and the civilian economy. As the current expansion program nears its peak during 1952, it is expected that more structural steel will be made available for important projects which have been deferred, while the increase in production of steel plate should materially benefit highway construction.

"If there is any other way in which we can be of assistance to you, please do not hesitate to call on us."

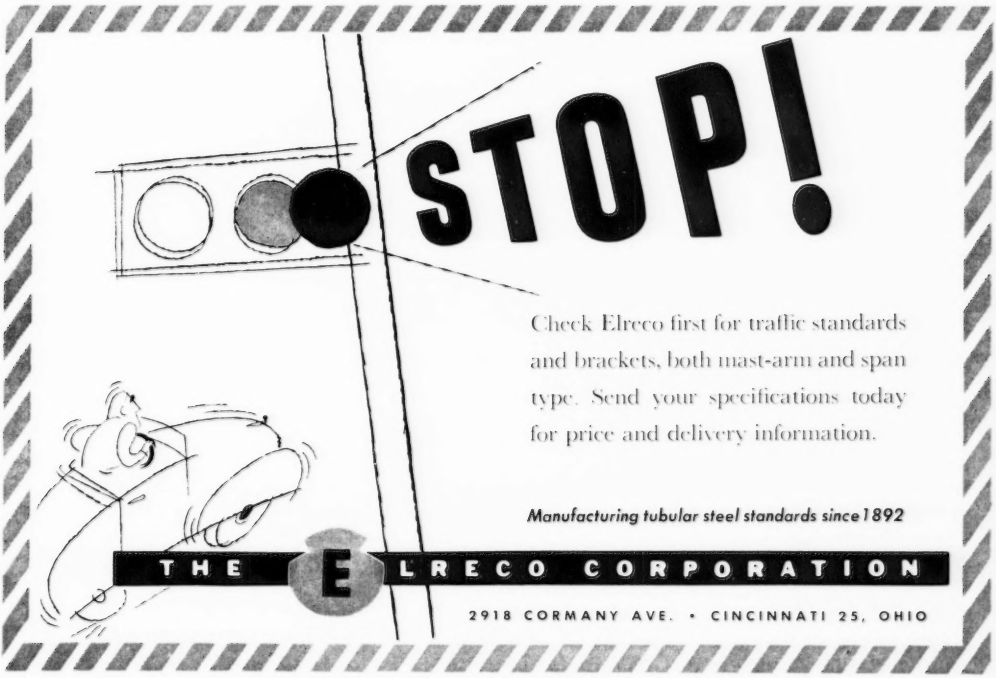
President Cherniack responded to Mr. Burke's communication with the following letter:

"Thank you very much for your letter of December 27, 1951, in response to mine directed to Mr. Charles E. Wilson, relating to Resolution No. 6 by the Institute of Traffic Engineers, concerning the necessity for an increase in the allocation of steel and other critical materials for highway purposes.

"Your report indicating that since the date of my letter the Defense Production Administration has granted an additional 10,000 tons of carbon steel, including 2,500 tons of structural steel; that DPA is determined not to repeat the mistake of World War II of considering highway construction in an emergency, postponable; and that DPA hopes to provide steel for normal highway maintenance and for urgently needed new highway construction projects —is indeed heartening to our entire membership.

"I am sure our members will follow keenly the indicated gradual tapering off of the present steel shortage. We would, therefore, be appreciative if, from time to time, we could be informed, as the current expansion program nears its peak in 1952, just how much structural steel has been or will be available for important highway projects which had to be deferred.

"Thank you again for your efforts in the direction of our mutual interests."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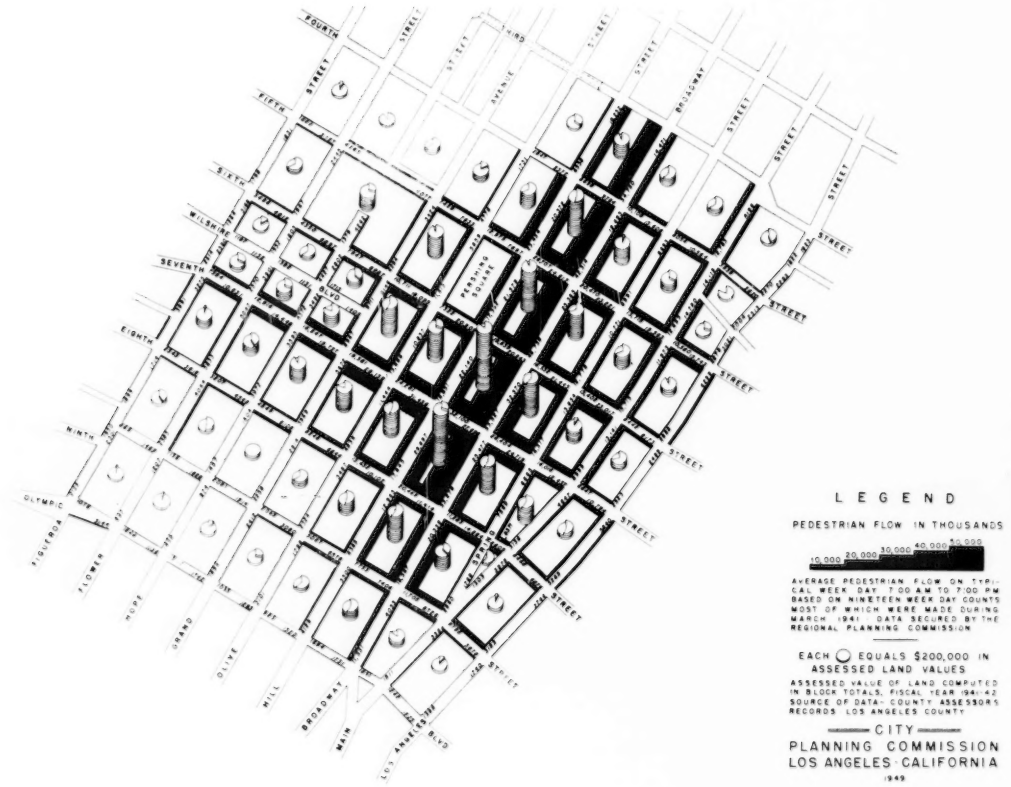
Reference Notes

The accompanying chart was included in a letter written by the Central Business District Association, Los Angeles, to property owners in the Central Business District. The letter urges complete evaluation of what is taking place in the C.B.D., and points toward the use of traffic studies to determine means of achieving the free and easy flow of vehicular and pedestrian traffic and the stabilization of property values in the Central Business District.

A glance at the chart reveals the relation of pedestrian flow to assessed land values.

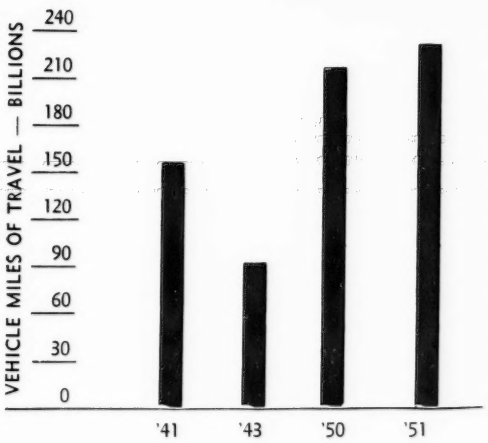
Before problems of the Central Business District can be solved, cause and effect must be investigated and evaluated. Hence the necessity of the studies listed in detail.



ASSESSED LAND VALUES
IN RELATION TO PEDESTRIAN FLOW

LOS ANGELES CENTRAL BUSINESS DISTRICT STUDY

Traffic Trends



TRAVEL ON RURAL ROADS FOR FIRST ELEVEN MONTHS of 1941, 1943, 1950 and 1951.

Based on Bureau of Public Roads Data

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TRAFFIC NEWS

Frank W. Edwards Appointed Coordinator Of Engineering Centennial Program

Plans for the Centennial of Engineering to be held in Chicago next summer have taken another step forward with the appointment of Frank W. Edwards, director of the department of civil engineering at Illinois Institute of Technology and nationally known hydraulic engineer, as general manager.

Selection of Edwards, who has been granted a leave of absence to direct the $1,000,000 celebration which will be of international proportions, was announced by its president, Lenox R. Lohr.

Edwards, who is also secretary of the National Conference of Industrial Hydraulics, spent the 13 years prior to 1946 as a civilian executive with the U. S. Army Corps of Engineers. He was chief of special hydraulic structures for flood control at Los Angeles; chief of the hydraulics section for Mississippi River flood control at New Orleans; and chief of the hydraulics section of the third locks project in the Panama Canal Zone.

In his new capacity with the Centennial he will coordinate a program that includes a five-year exhibit of world-famed engineering accomplishments, to be staged at the Museum of Science and Industry; a summer-long pageant that is expected to tell the story of engineering to more than a million spectators; and a convocation that will attract approximately 50,000 engineers to Chicago.

The *Institute of Traffic Engineers* will participate in the convocation by joining with other national engineering organizations in holding their annual meetings in Chicago during the centennial. The *Institute* will also take part in the exhibit and pageant.

Cooperating with Edwards and Lohr, in executive direction of the project, is Charles F. Kettering, General Motors research leader. Coincident with Edwards' appointment, Lohr also announced the heads of two of the Centennial convocation committees.

Howard F. Peckworth, managing director of the American Concrete Pipe Association, was named chairman of the coordinating committee on general arrangements; and G. Donald Kennedy (Mem., ITE), assistant to the president, Portland Cement Association, was named chairman of the committee on technical programs. Both are Chicagoans.

New Training Manual Available

Through the arrangements of Mr. Carl McMonagle (Assoc. Mem., ITE), Director of Planning and Traffic, Michigan State Highway Department, a new training manual has recently been completed. This manual is entitled "A Police Training Manual on the Apprehension of Traffic Signal Violators." It was prepared under the auspices of the Michigan Association of Chiefs of Police. The first half of this 62-page Manual deals with the actual apprehension of violators by the police. Its 16 typical cases are described in detail. The second half of the Manual deals with traffic signal standards and specifications as recommended by the State Highway Department.

This is a good example of coordination between the police and engineers.

The Manual was launched through 12 zone training schools attended by local police from all parts of the state. In each case a district traffic engineer of the Highway Department served as one of the three instructors and covered the second part of the Manual.

This arrangement offered the Highway Department an excellent opportunity to explain the traffic signal standards as related to an enforcement program. This operation was a part of the general plan developed by Maxwell Halsey (Mem., ITE), Executive Secretary of the Michigan State Safety Commission as one of the six state-wide traffic safety programs conducted during 1951. During the month of August all Michigan Safety organizations conducted a public educational program on the subject of traffic signals using the official slogan "obey traffic signals." All educational media were used as previously described in "Public Support and Traffic Engineering," by Mr. Halsey in the August 1951 issue of TRAFFIC ENGINEERING. The Traffic Signal Manual is one of six training manuals prepared over a period of years in Michigan as a part of the coordination program.

The second new Manual is entitled "A Police Training Manual on the Apprehension of Reckless Driving Violators." Any state wishing to conduct a parallel program may obtain free copies of the Signal Manual by writing to Mr. J. Carl McMonagle, Director, Planning and Traffic, Michigan State Highway Department, 222 Townsend Street, Lansing, Michigan. The Manual on Reckless Driving may be obtained free by writing to Mr. Maxwell Halsey, Executive Secretary, Michigan State Safety Commission, 501 West Michigan Avenue, Lansing, Michigan. Manuals of this type can do much to further improve the relationship between Highway Departments and local officials.

Total Highway Disbursements Exceed $4½ Billion in 1950

Total highway disbursements by all units of government in the continental United States in 1950 are estimated at $4,582,000,000, according to recent estimates made by the U. S. Bureau of Public Roads (*Highway Finance, 1945-1950*). In comparison, 1949 disbursements are estimated to be $4,182,000,000.

The most marked increase during the six years covered is in capital outlay, and particularly capital outlays for state highways, which in 1950 accounted for $1,553 million out of total capital outlays of $2,391 million.

In view of the inflation of the highway dollar, trends in dollar expenditures do not accurately indicate trends in accomplishment made through the expenditures of these dollars. While there is no single comprehensive index, the price index for Federal-aid construction in 1950 was 203.4% of the *1940* base period. It has further risen to 226% in the second quarter of 1951, the latest available figure.

Student Chapter Organized at Yale

The Yale Bureau of Highway Traffic has announced that on October 16, 1951, its 1951-52 class voted unanimously to form a student chapter of the *Institute*. The class consists of 22 men from all parts of the U. S., from Canada, Switzerland, Puerto Rico, India and Turkey.

Newly elected officers of the Yale Chapter are: Alan M. Voorhees, President; Robert B. Campbell, Vice-President; and Richard R. Long, Secretary-Treasurer. F. Houston Wynn, Assistant Professor of the Bureau, is the faculty advisor.

The Chapter is planning an active program of social and technical activities. In addition to attending the meetings of the New England Section of the *Institute* the Section is planning a number of meetings of their own. Max N. Clyde is the Social Chairman and John I. Logan is the Business Chairman of these meetings.

City of New York to Purchase Traffic Signs And Signal Equipment For Over $600,000

The City of New York Department of Traffic has announced plans for the purchase of traffic signal equipment at a total of $498,000. The equipment will include traffic signals, posts, pedestals, poles, mast arms, brackets, controllers, conduit, cable, and various types of accessories.

These materials will be used to carry out the Department's traffic signal program. This entails the installation of traffic signals at approximately 60 intersections in the five boroughs of the city, as well as the modernization of the signal control equipment at about 120 intersections throughout the city.

The Department of Traffic has also announced the award of two contracts totaling $102,847.87, for the installation of 4,426 "STOP" signs and 3,715 "SCHOOL CROSSING" signs, a total of 8,141 new signs, in the five boroughs of the City.

One contract calls for 3,735 "STOP" signs and 2,260 "SCHOOL CROSSING" signs to be installed in Brooklyn and Queens at a cost of $72,697.38. The second provides for the installation of a total of 691 "STOP" signs and 1,455 "SCHOOL CROSSING" signs in Manhattan, The Bronx, and Richmond, at a cost of $30,150.49.

The "STOP" signs will be used largely to establish the first portion of a network of "through" streets. All intersections along these streets are to be controlled either by traffic lights or "STOP" signs.

The "SCHOOL CROSSING" signs will be installed in accordance with the Department's program of establishing individual traffic safety plans for each of the more than 1,000 public and parochial elementary and junior high schools throughout the city. The signs will be placed in locations designated on individual maps delineating the traffic safety plan for each school area.

Forty-six "through" streets are to be established in Brooklyn, 47 in Queens, and 17 in The Bronx. Miscellaneous "STOP" sign installations also will be made in Manhattan and Richmond. The work to be completed within 150 days.

Laws Governing Trailer Coaches Digested in New Book

Laws and regulations governing licensing and operation of trailer coaches are outlined in "State Motor Vehicle Laws Affecting Trailer Coaches," published by the National Highway Users Conference here recently.

In announcing release of the book, Arthur C. Butler, Conference Director, said that 100 manufacturers are now producing 100,000 trailer coaches annually. "This is a new industry that has grown to more than a $100 million a year business in less than 20 years, with a total investment of $170 million," Mr. Butler said.

The publication points out that the use of trailer coaches is widespread and on the upswing, and that laws and regulations applying to them are constantly changing. The Trailer Coach Manufacturers Association and other directly interested groups, including NHUC, favor uniformity in laws and regulations to facilitate country-wide movement of trailer coaches.

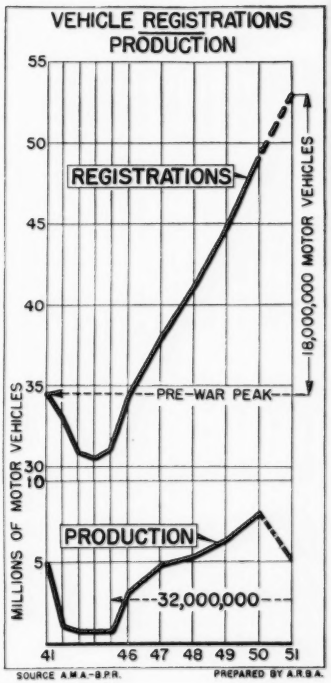
The NHUC publication digests laws and regulations on registration of trailer coaches, equipment requirements, size restrictions, special equipment, and speed limits.

In prior editions of this publication, the trailer coach has been referred to as "house trailer." The term "trailer coach" is largely used in this booklet because it is recommended by the American Association of Motor Vehicle Administrators and the Trailer Coach Manufacturers Association in the interest of standard terminology, and to avoid confusion in determining definitions in state laws. The term "house trailer" is used only when it is specifically in the law.

Car Registry Hits Peak

Motor vehicle registrations are expected to approximate a record figure of 52,800,000 for the year 1951 as compared to 49,143,000 in 1950. The average annual increase since 1945 has been 3,700,000 vehicles for the six year period. Included in the annual increase are approximately 700,000 trucks and buses. Since the war the number of motor vehicles has increased 50 per cent, and trucks 80 per cent. Vehicle miles of travel have increased 100 per cent, and truck ton mileage 110 per cent.

Unfortunately the highway program has not matched the huge expansion in highway use, and is now threatened with new restrictions. The federal aid highway system carrying 80 per cent of the nations rural traffic is wearing out twice as fast as it is being replaced.



Engineering Session of Governor's 3rd Safety Conference Held in Oregon

The *Oregon* Governor's 3rd Annual Safety Conference was held in Portland, Oregon, November 28, 29 and 30. The Engineering Session of the Traffic Safety Section of the Conference discussed "Making Better Use of Today's Streets and Highways." J. Al Head, Assistant Engineer, Oregon State Highway Department, presided over the discussion panel. Other members of the panel and the subjects they discussed were as follows:

Fred T. Fowler, Traffic Engineer, City of Portland, "Minimum Warrants for Traffic Controls."

Val Johnson, Traffic Control Engineer, Oregon State Highway Department, "Accident Records: Their Application and Availability."

Oren King, City Manager, Eugene, Oregon, "Parking Controls on City Streets."

Martin P. Coopey, Associate Professor, School of Engineering, Oregon State College, "Traffic Engineering Education."

Ron Moxness, Staff Writer, The Oregonian, "The Road User Views Traffic Engineering."

The members of the panel shown in the accompanying photograph are (from left to right): Oren King, Fred T. Fowler, Martin P. Coopey, Val Johnson, Ron Moxness, and J. Al. Head.

Access Road Needs Exceed Federal Authorization

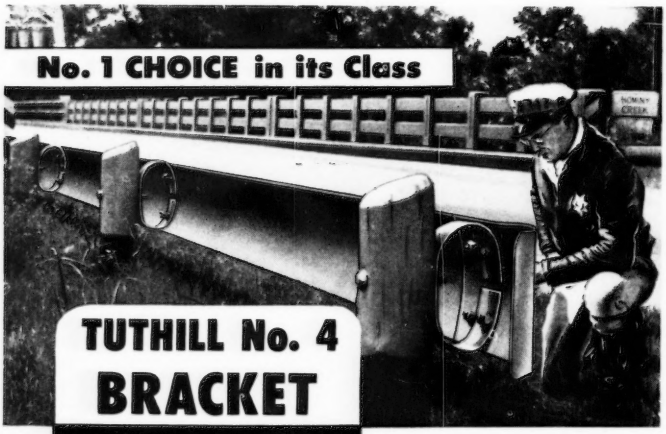
Programmed construction of access roads to military and defense installations and to areas supplying needed raw materials in the national defense effort has exhausted the funds available to the Bureau of Public Roads for such construction, Thomas H. MacDonald, BPR Commissioner, told the Roads Subcommittee of the House Public Works Committee recently.

Mr. MacDonald testified in behalf of that portion of H.R. 5258, currently being considered by the subcommittee, which would raise the present limitation of $5 million for access road construction by the Federal government to $15 million.

A statement of General James A. Anderson, President of the American Association of State Highway Officials (read to the subcommittee by Hal H. Hale, AASHO Executive Secretary) supported all provisions of H.R. 5258 except that which prohibits the use of access road funds on the Federal-aid Primary System.

"We can easily see," General Anderson's statement said, "the situation that could develop in those states requiring a large Access Road program in the interest of national defense of the country as a whole. If these Access Roads had to be provided from already limited Primary Federal-aid and state matching funds, and they were not of lasting benefit to the state's main highway system, it could very easily consume the bulk of the highway budget, to the detriment of the state's over-all highway system. This inequity, we believe, should be removed to permit the use of these proposed Access Road Funds on a reasonable basis on the Primary System as well as elsewhere, as provided in the Act of 1950."

The AASHO testimony concluded by asking that the subcommittee "give serious study to the grave problems now confronting us in securing necessary steel for the present carrying forward of a reasonable program of modernization and reconstruction of our highway system." The steel shortage was characterized as "a most difficult and serious situation confronting the highway officials today."



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See December "Traffic Engineering" magazine for further details.

Special Group Appointed By U. S. Chamber of Commerce

Appointment of special study-groups to re-examine its national and international transport policies was announced September 6 at a meeting of the Transportation and Communication Committee of the Chamber of Commerce of the United States.

Recommendations growing out of these studies will be presented to the Chamber membership for final approval at the 1952 Annual Meeting.

Among the other subjects discussed at the Transportation & Communications Committee meeting, the first one for the new 1951-52 Committee, were highway financing and user charges, air subsidy separation and three transportation conferences to be sponsored by the Chamber in the coming year.

New England Traffic Seminar Held At M.I.T.

For the first time in the development of traffic signal equipment, a New England Seminar for discussion of traffic control and traffic signal appliance was held at the Massachusetts Institute of Technology at Cambridge, Massachusetts, on Tuesday, November 13th and Wednesday, November 14th, under the sponsorship of the Commonwealth of Massachusetts Department of Public Works and the Eagle Signal Corporation. Cooperating in this Seminar was the Civil and Sanitary Engineering Department of the Massachusetts Institute of Technology in connection with the Joint Highway Research Project now under way in collaboration with the Massachusetts Department of Public Works.

The Seminar was attended largely by State and Municipal traffic engineers and traffic maintenance men. A large number of members of the I.M.S.A. and some members of the Institute of Traffic Engineers were present. There were four sessions in this Seminar and the average attendance was close to one hundred at each of the sessions.

The program was of an engineering character and included papers on Traffic Movement Engineering by Mr. Holden LeRoy, Senior Associate Traffic Engineer of the City of Detroit, Michigan; Specifications and Installation Methods by Mr. Bernard B. Twombly, Radio and Traffic Signal Engineer, Commonwealth of Massachusetts, Department of Public Works; engineering discussions on Pre-timed Traffic Controllers by Mr. E. R. Malthouse, Actuated Traffic Controllers by Mr. F. A. Pearson; Pedestrian Traffic Control by Mr. J. H. Keim; and a new and intriguing method for making Time Space Diagrams by Mr. Gar Fieser, Electrical Engineer, all of the Eagle Signal Corporation.

U. S. Automobile Traffic To Mexico Rises

The number of tourist automobiles entering Mexico through the three principal gateway cities of Laredo, Brownsville and El Paso, Texas, was 13 per cent greater in the first four months of this year than during the same period of 1950. The International Travel Department of the American Automobile Association reported a total of 20,396 cars crossed the border bridges at these points from January through April this year as compared with 18,000 a year ago.

SECTION NEWS

Indiana Section

The recently approved Indiana Section of the Institute of Traffic Engineers held their organizational meeting in Indianapolis on December 14, 1951. John H. Bunch was elected President, Elmo E. Stuckey, Vice-President, and James B. Neff, Secretary-Treasurer of the Section which has twelve charter members.

Many Section members are also members of the Indiana Traffic Engineers Association, a State organization which has preceded the newly formed Section, and it is hoped that all members of the I.T.E.A. will join the Section either through ITE membership or affiliation.

The next meeting of the organization will be held during the Annual Purdue Road School in April, 1952. All visiting ITE members are cordially invited to attend.

Reported by John Bunch
President

Midwest Section

The December meeting of the Midwest Section was highlighted by an unusually large attendance and an extremely interesting speaker, a result of the combined efforts of the attendance committee, under Evan Olmstead and the program committee under Pete Page.

Col. George D. Gaw, President of Color Analysis and Design Evaluation, Inc., held the rapt attention of the members present with his discussion of "The Power of Color and Its Influence on Human Behavior." Col. Gaw compared color to music, one being vibrations of sound and the other being vibrations of light. Like music, color has the power to affect a person's emotions, red being a stimulant and blue a sedative. The color of an office, a kitchen, a living room, or a hospital room will affect persons spending long periods of time in those rooms, and often these people will blame other factors for their feelings.

Col. Gaw explained how the eye sees color and gave several interesting case histories illustrating the phenomenon of "after image." This is the principle involved in the decision to paint hospital operating rooms blue-green instead of white. He went on to explain that a hue is a pure color; adding various amounts of white gives tints, adding various amounts of black gives shades, and adding both black and white gives tones. These combinations can be work out mathematically and have been set up in what is known as the Oswald System.

Col. Gaw also commented on the use of color in transportation and traffic. He said light colored cars are safer because they are more visible, both day and night. He suggested that the inside of public transit vehicles be painted blue-green for the comfort and ease of both passengers and operating personnel. He criticized the carbon black used on most signs, suggesting a blue-black, particularly on yellow backgrounds. He stated that for legibility and attention value, black on yellow is the best combination with other combinations in the following order: green on white, red on white, blue on white, and black on white.

Since having received such an intimate view of the power and influence of color, everyone present left this most interesting session with the strong conviction that more knowledge and use of these principles are necessary for the development of the field of Traffic Engineering.

Reported by Ralph Gross
Secretary-Treasurer

New England Section

The New England Section gathered at 4 P.M. at Johnson's Hummocks Grill in downtown Providence recently. Through the courtesy of the Providence Traffic Engineering Department, the members were loaded into an open-air sight seeing bus for a trip around the city to inspect some of the completed projects and some under way for the improvement of traffic conditions. The bus was a gaily-painted vehicle and named "Miss Providence." *Anti-freeze* should have been issued to each visitor prior to the beginning of the tour which had been organized by Bob Jaffee and which was ably described by Roger Chandler. Under cover of darkness the group was brought back to Johnson's Grill for an excellent dinner.

Bob Williston, in the absence of Pete Hale and Hugh Wynn, acted as the presiding officer for the session following the dinner. He introduced Bob Jaffee who had made all the arrangements for the meeting. Bob in turn introduced Dwight Myers, Providence Traffic Engineer who extended a welcome to Providence and introduced to the members, Police Chief Warren Martin and Police Captain Joseph Burns who have lent considerable assistance to the progress of the so called Myers Miracles. Captain Burns spoke briefly describing the trials and difficulties encountered during the first few days of official operation of Myers Mystic Maze, the work involved in the short O & D survey that preceded it and the interest of the Police Department in further promoting traffic engineering improvements.

The principal speaker of the evening, Judge Luigi DePasquale, was next introduced by Bob Jaffee. Judge DePasquale, who has presided in the local district court for the last 16 years, made four points during his remarks:

(1) It has been the desire of the local court to establish public respect for the importance of traffic violations in court.

(2) The need for traffic problems to be public records with proper access to them by the newspapers.

(3) The need for adequate and appropriate signs relative to traffic regulations.

(4) The need for Police Department representation in court with the prosecution or presentation of traffic cases.

He closed his remarks by suggesting that Providence has been successful in controlling speeding because the general public recognizes two facts with respect to Providence; (1) "Drive Slow and See the City" (2) "Drive Fast and See the Judge."

A question and answer period followed in which it became apparent that Judge DePasquale firmly believes that there is a human side to the court which should be understood and respected by the public. He suggested that all too often in traffic violation cases the defendant is described by his attorney as a poor man with seven children who should be excused for a violation of traffic laws. In contrast the victim of the violation is often a man who has 12 children, is now dead and has left the children behind him because of the negligence of the defendant.

Reported by Robert M. Williston
Secretary-Treasurer

New York Section

The second meeting (luncheon meeting) of the 1951-1952 fiscal year was held at the Masonic Club on November 29. Eighteen members and guests were present at this meeting. Mr. Bender reported on policy of national ITE organization in reference to participation in the Annual Meeting of the Greater New York Safety Council. Mr. Edward G. Wetzel made a motion to appoint a committee to increase membership in the local section. This motion was carried unanimously. Mr. Nathan Cherniack suggested that more publicity be given to the local section meetings.

The Program Committee is planning to arrange a tour of the newly opened New Jersey Turnpike in the near future.

(See SECTION NEWS, page 158)

Personalities . . .

HOWARD M. BAKER (Assoc. Mem., ITE) was the first Canadian to come under the wing of Miller McClintock. This occurred back in 1937 when he was awarded a Fellowship to attend the Harvard Bureau for Street Traffic Research of hallowed memory.

Considerably prior to that, however, he was born in Montreal, Quebec, back in 1909. He received his early education at the high school of Montreal, graduating from there in 1927.

He then progressed on to McGill University where he continued his studies in the Faculty of Commerce, specializing in Economics and Accountancy, and receiving his degree of Bachelor of Commerce in 1931. His sojourn at McGill was again more noted for his athletic activities than for his scholastic achievements. He won several senior athletic awards, and was Intercollegiate, Provincial and Dominion hurdles champion on several different occasions. In addition, he participated actively in all forms of undergraduate activities, and won a debating championship in his final year.

Nothing had been further from his mind when at McGill than the field of traffic engineering. His major interest was in the field of international commerce, and all his courses at McGill had been chosen with the view of pursuing an active career in foreign parts as a Trade Commissioner for the Canadian Department of Trade and Commerce. Fate now entered into the picture in the form of the Montreal Police Department whereby he was to be introduced to the problems of traffic control. There had always been keen inter-city rivalry between Montreal, Detroit, Toronto, etc., in their annual track and field championships. With these competitions in mind,

(*See* BAKER, *page 158*)

GORDON GRAVELLE (Mem., ITE) considers himself a native of the Upper Peninsula of Michigan. His first contact with large metropolitan transportation problems came when he enrolled at Ann Arbor in the University of Michigan. For three and a half years

he pursued the study of aeronautical engineering. His interest in transportation led him to transfer to the Department of Civil Engineering, where he completed his education under Professor Morrison. Following graduation, Gordon did graduate study in transportation while employed as an air conditioning engineer in Detroit, Michigan.

In 1939, he received a fellowship to the Yale Bureau of Highway Traffic. Upon graduation, he accepted a position with the Michigan State Highway Department, Division of Traffic Engineering, as Municipal Traffic Engineer. Michigan was one of the first states to consider the urban traffic problems on State Highways in metropolitan areas.

Five days after Pearl Harbor, Gordon reported for duty with the Corps of Engineers as a second lieutenant at Fort Belvoir, Va., where he served as a development and testing engineer in the Traffic Control Branch of the Engineer Board. During a two and a half year tour of duty at The Engineer Board, he participated in the development of traffic control manuals and traffic devices for military use. Early in 1944, he was assigned to the Transportation Corps, European Theater of Operations, Office, Chief of Transportation, as Chief of the Planning Branch in the Control and Planning Division. In this assignment he participated in the development of transportation plans for the European Operation. In cooperation with Colonel Day, he laid out the route of the Red Ball Express Operation and later, assigned to British Headquarters he assisted in the planning for the opening of the Port of Antwerp. In recognition of these and other services, he was awarded the Legion of Merit decoration.

Returning from overseas after two years duty, he accepted a position with the Capital Transit Company in Washington, D. C., as Traffic Engineer. In this position Gordon worked closely with the Department of Vehicles and Traffic for the improvement of traffic and transit operations in the District of Columbia.

In May of 1949, he became Transportation Engineer in the Traffic Engineering Division of the Automotive Safety Foundation. Gordon's first assignment was that of resident engineer on the Albuquerque Highway Transportation study. Since then, he has been active in Automotive Safety Foundation studies in Ohio, Virginia and in the cities of Syracuse, New York; San Diego, California; and Salt Lake City, Utah.

Gordon met his wife, the former Aileen Clark, while both were attending the University of Michigan. They have two children, Karen and Clark Gordon.

According to Gordon's report, he can hold his own at bridge or Michigan Buck-Up; however, this statement may be disputed by other members of the Traffic Engineering profession!

First Parking Meters Installed in City of New York

Culminating a two-year effort to obtain trial installations of parking meters in the City of New York, the first group of such meters were placed in operation by the Department of Traffic on 125th Street, in Manhattan, recently.

This installation is the first to be operated experimentally at five specially selected locations in Manhattan, Brooklyn, The Bronx and Queens. A total of 1,500 meters have been purchased and will be installed under the direction of the Department of Traffic. The total cost of the meters and their installation is $75,000. It is expected that all five areas will be in operation by the end of October.

BAKER . . .

(Continued from page 157)

he was invited to participate for the Montreal squad, and at the same time to accept a temporary position in that Department until such time as new appointments were made in the Department of Trade and Commerce. As time went on without such vacancies occurring, this temporary position grew into a permanent one, with his attention and duties being centered around matters of traffic control, discipline and general departmental administration.

After returning to Montreal upon graduation from the Harvard Bureau for Street Traffic Research, he organized a Traffic Engineering Bureau which was placed in the Traffic Division of the Montreal Police Department for administrative purposes. This new Bureau was charged with traffic studies, and the installation, operation and maintenance of all traffic control devices in the City of Montreal.

At the outbreak of World War II he was granted a leave of absence and enlisted in the Canadian Army. He was posted to the Canadian Provost Corps where he served first as Provost Marshal for Military District No. 4 in Canada, and later, with 4th Canadian Armoured Division overseas. On the formation of headquarters, 2nd Canadian Corps, he was appointed Deputy Assistant Quartermaster General, and in that capacity was in charge of operational movement control of 2nd Canadian Corps in England, France, Belgium, Holland and Germany. In recognition of his services he was made a Member of the British Empire, was mentioned in Despatches, was named Chevalier of the Order of the Crown (with Palm), and was awarded the Croix de Guerre (with Palm) by the Belgian Government.

He retired from the Army with the rank of lieutenant-colonel in May 1946, and immediately joined the Montreal Transportation Commission as Traffic Analyst. As such, he conducted various types of traffic studies in relation to the operation of public transit facilities. These included running time studies, the operation of express buses, streetcar operation in central shopping districts, the provision of transit facilities in newly decentralized industrial areas, intersectional redesign, etc.

He served in that capacity until May 1949, when he was appointed to his present position as Safety Director. This entailed the organization of a new department for the prevention and reduction of traffic and passenger accidents, equipment studies, safety promotional work, intersectional studies and public relations.

By way of extra-curricular activities, he assisted in the organization of, and lectured at, Motor Vehicle Fleet Supervisors' Courses at McGill University. In addition, he lectured on several different occasions at the Canadian Police College operated by the Royal Canadian Mounted Police on "Traffic Engineering by Police Departments."

He maintains an active interest in the activities of many organizations, including the Institute of Traffic Engineers, the American Road Builders Association, the American and Canadian Transit Associations, and the American Society of Safety Engineers. In addition, he is a member of the Kiwanis Club of Montreal, the Montreal United Service Institute, the Canadian Legion, the Mount Royal Tennis Club and the Graduates Squash Club.

SECTION NEWS . . .

(Continued from page 156)

Mr. Elmer B. Isaak, Engineer of Traffic Studies and Reports for the consulting firm of Madigan-Hyland, gave an illustrated lecture on the "Methods of Collecting Data for the New York State Thruway." He also explained the toll system to the group.

Reported by Lou E. Bender
Secretary-Treasurer

Western Section

Earle Taylor, District Traffic Engineer for the Fresno district, California Division of Highways, has issued a challenge to the other ten district traffic engineers to participate in a contest to determine which district traffic department can have the largest percentage of its personnel as members of the ITE by next June. Nick Carter is to be contest judge, with George Webb holding the prize money. Earle suggests that such a contest might be useful also on an interstate basis.

The Western Section is scheduling a dinner meeting at the Hollywood Roosevelt Hotel in Los Angeles the evening of February 6, 1952. This session, being held in conjunction with the Fourth Annual California Conference on Street and Highway Problems, is expected to have an attendance of between 250 and 300 people. All ITE members and friends who expect to be in the Los Angeles area at that time are welcome. Joe Havenner is arranging the program.

An ITE dinner was held in Salem November 30 as a follow up of the Oregon Governors Safety Conference. Over 40 were in attendance, including 10 ITE members from Connecticut to California. Bruce Crandall gave an address in which he offered to trade Oregon's yellow center line for California's red stop sign. Al Head presided. Bud George arranged for the dinner.

A Traffic Safety Lighting Meeting was held in Fresno in December with California Division of Highways engineers Nick Carter, Dick Wilson, Earle Taylor, Jerry Skiles, Mel West and Blair Geddes in attendance.

Bruce Crandall, ITE Vice-President, visited Olympia, Washington, and presented to Governor Arthur B. Langlie and William A. Bugge, Director of Highways, of the State of Washington, the first place plaque for traffic engineering programs for the Group IV states.

The engineering session of the Traffic Safety Section of the Oregon Governors Annual Safety Conference discussed "Making Better Use of Today's Streets and Highways." Al Head, Assistant Traffic Engineer of Oregon, presided. The other members of the panel, and the subjects they discussed, were as follows:

Fred P. Fowler—"Minimum Warrants for Traffic Controls."

Val Johnson—"Accident Records: Their Application and Availability."

Oren King—"Parking Controls on City Streets."

Marvin P. Coopey—"Traffic Engineering Education."

Ron Moxmess—"The Road User Views Traffic Engineering."

(See page 154 for photograph showing these panel members).

Two one-day traffic engineering conferences were held in San Jose, December 7, and San Mateo, December 14, under the sponsorship of the Institute of Transportation and Traffic Engineering, University of California. These conferences were designed for city managers, city engineers, planning officials, and others with responsibilities in the field of traffic engineering.

Approximately 40 persons attended each meeting. Don Berry and Norm Kennedy served as instructors on such topics as "Traffic Problems and Engineering Approaches in Their Solution," "Relieving Traffic Congestion," "Computing Intersection Capacity," "Correcting High Accident Locations," "Curb Parking and Loading Control," and "Assigning Responsibility for Traffic Engineering." Each person attending received a 20-page booklet with notes.

Reported by Donald S. Berry
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FEBRUARY 6-8, 1952—LOS ANGELES, CALIF.
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MARCH 13, 1952—WASHINGTON, D. C.
Annual Meeting. National Committee for Traffic Safety.

APRIL 1-4, 1952—NEW YORK CITY
The 22nd Annual Convention and Exposition of the Greater New York Safety Council.

APRIL 28-30, 1952—WASHINGTON, D. C.
Annual Meeting. Chamber of Commerce of United States.

MAY 6-8, 1952—WASHINGTON, D. C.
Fourth Highway Transportation Congress, National Highway Users Conference.

Fourth Illinois Traffic Engineering Conference Held

The Fourth Illinois Conference on Traffic Engineering was held at the University of Illinois, November 13-14, 1951. The Conference Chairman was C. C. Wiley, Professor of Highway Engineering, University of Illinois. The Conference was opened by W. C. Huntington, Head, Civil Engineering Department, University of Illinois. The total attendance was 118 who heard twelve traffic and safety talks and attended the discussion seminars. Harry H. Harrison, Traffic Engineer, Illinois Division of Highways, and Matthew C. Sielski, Director, Traffic and Safety Department, Chicago Motor Club, were in charge of the seminars.

The seminar was conducted by the Department of Civil Engineering, University of Illinois; The Illinois Division of Highways; The Midwest Section of the Institute of Traffic Engineers; and the Illinois Traffic Safety Council. Speakers on the program were: Myron K. Lingle, Assistant Engineer of Traffic, Illinois Division of Highways; Elmer Knight, Assistant Chief Highway Engineer, Illinois Division of Highways; Captain William Morris, Illinois State Police; Evan E. Olmstead, Traffic Engineer, Chicago Transit Authority; T. T. Wiley, Acting Commissioner, Department of Traffic, New York City; C. E. Chenoweth, Assistant Engineer of Operations, Bureau of Traffic, Illinois Division of Highways; Ernest Miller, City Traffic Engineer, South Bend, Indiana; A. E. Florio, Supervisor of Safety Education, University of Illinois; William R. Marston, Deputy City Traffic Engineer of Chicago; Daniel J. Hanson, Assistant Traffic Engineer, City of Champaign; Laurence A. Kane, Traffic Control Corporation, Chicago; and C. C. Wiley, Professor of Highway Engineering, University of Illinois.

Crops Multiply With Construction Of New Road

Farm crops in the valleys of Zamora and Ixtlan, Mexico, are five times greater this year than in 1950 because of the construction of a new road between Zamora, Mich., and La Barca, Jal. The road was built by the Mexican National Rural Roads Committee, at a total cost of (pesos) $2,520,000, or (pesos) $346,700 a kilometer.

Texas and West Virginia Adopt Periodic Motor Vehicle Inspection

Periodic inspection made one of its biggest forward strides this year when West Virginia and Texas joined 12 other states and the District of Columbia in requiring regular inspection of automobiles, trucks and buses.

With nearly one-third of all states now requiring regular inspection of automotive equipment as a highway safety measure, the total of vehicles inspected annually will rise in 1952 to more than 13,000,000. Texas and West Virginia will add from 3,500,000 to 3,750,000 vehicles to the 9,250,000 vehicles inspected this year in the twelve states and the District of Columbia which for some years have had laws requiring inspection.

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ON THE SHELF

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Mrs. Kathryn Cassidy, Librarian
Yale Bureau of Highway Traffic

Astoria. Oregon. State Highway Department. Traffic Engineering Division.

Traffic Signal Study, City of Astoria. The Division, 1951. Tables, charts, illus.

A study of the warrant for signalized control at street intersections in the downtown business section with consideration of other and less expensive types of traffic control where applicable.

Baker, Geoffrey and Funaro, Bruno

Shopping Centers, Design and Operation. Reinhold Publishing Corporation. 1951. (Progressive Architecture Library). $12.00.

A detailed and handsomely illustrated treatment of the whole problem of shopping centers, including marketing analyses, discussions of changes in retailing patterns, shifts of population. It contains also a chapter on what makes a good shopping center site, which discusses highway capacity, accessibility of the center, visibility, zoning, etc. and a chapter on various types of parking arrangements and the factors which must be considered. There is also a chapter on freight handling.

Brisbine, Dawes E. and Fisher, W. Yule

The Ton-Mile Tax and Related 'Third Structure' Taxes. National Highway Users Conference, 1950. 31p., pamphlet, tables.

An argument against the ton-mile tax with a survey of policies in various states.

Bruce, Arthur C. and Clarkeson, John

Highway Design and Construction. Third edition. International Textbook Company, 1951. $6.00.

A new edition of a standard work. Chapter seventeen discusses methods and purposes of the various kinds of transportation surveys.

Colorado. University. Engineering Experiment Station.

Twenty-fourth annual highway conference. The University, 1951. 94p., pamphlet, charts, graphs.

(Continued on page 164)

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(Continued from page 160)

Connecticut Highway Department.

Planning Study, Route 9, Granby to Hartford. The Department, 1951. 11p., mimeo.

In cooperation with the U. S. Bureau of Public Roads.

Detroit, Michigan, Mayor's Advisory Traffic Committee.

Meeting the Crisis of Street Transportation in Detroit; Recommended Physical and Administrative Improvements. Automobile Club of Michigan and Traffic Safety Association of Detroit, 1951. 32p., maps, charts, illus.

Dier, Robert D. and Barker, Bill.

School Crossing Hazard Study, City of Fresno, California. Traffic Engineering Division, Department of Public Works, 1951. 10p., mimeo., charts, tables.

Hamilton, Ohio. State Department of Highways.

A Comparative Study, Traffic Regulations of Hamilton, Ohio, with the Model Traffic Ordinances for Ohio Municipalities. The Department, 1951. 43p., pamphlet.

Harris, A. J. and Christie, A. W.

The Revealing Power of Street Lighting Installations and its Calculation. Reprinted from the Transactions of the Illuminating Engineering Society (London), Volume XVI, No. 5, 1951. 11p.

Highway Research Board.

Highways with a Narrow Median. The Board, 1951. (Bulletin No. 35). Presented at the thirtieth annual meeting, 1951. 95p., pamphlet, processed, illus., maps, graphs, tables, specifications.

Reports on the use of narrow medians in California, Connecticut, Illinois, Michigan, New Jersey and Ohio and an article on the effect of median dividers on the lateral placement of cars.

Highway Research Board.

Pavement Marking. Presented at the Thirtieth Annual Meeting. Bulletin No. 36. The Board, 1951. 28p., pamphlet.

Contents: "Report of the Committee on Pavement Markings," by A. R. Lauer, Chairman; "Methods and Application Procedures for Pavement Marking," by Charles R. Waters; "Present Preferences for Traffic Paint," by G. W. Ashman.

Madison, Wisconsin. State Highway Commission.

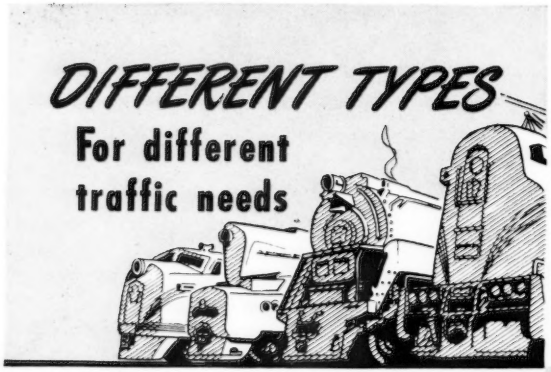
Madison Traffic Survey. The Commission. In cooperation with the U. S. Bureau of Public Roads, 1951. 3 vols.

Contents: Vol. 1—Traffic survey; Vol. 2—Traffic information; Vol. 3—Traffic survey— tables.

North Carolina. State Highway and Public Works Commission.

Minimum Standards for Entrances to Highways from Commercial Establishments. The Commission, 1951. 21p., pamphlet.

Designs and specifications for entrances into highways.



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